

HOW TO



STUFF
BIRDS AND
ANIMALS

Project Gutenberg's How to Stuff Birds and Animals, by Aaron A. Warford

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A valuable book giving instruction in collecting, preparing, mounting, and preserving birds, animals, and insects

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—

A VALUABLE BOOK.
GIVING INSTRUCTION IN
COLLECTING, PREPARING, MOUNTING,
AND
PRESERVING
BIRDS, ANIMALS AND INSECTS

—

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HOW TO
Stuff Birds and Animals.

CHAPTER I.

SKINNING, PREPARING, AND MOUNTING THE MAMMALIA, OR QUADRUPEDS.

SKINNING.

When a quadruped is killed, and its skin intended for stuffing, the preparatory steps are to lay the animal on its back, and plug up its nostrils, mouth, and any wounds it may have received, with cotton or tow, to prevent the blood from disfiguring the skin. The fox will serve admirably our purpose as an example. Therefore, Reynard being procured, we need not say how, lay him on his back in the same position as before recommended; and, having first stuffed the mouth with cotton and tied it up, and measured his neck and body with rule and calipers, and noted them, proceed. Make an incision from the last rib nearly to the vent, but not quite up to it. Having done so, proceed to raise the skin all round the incision as far as the thighs, first skinning one side and then the other, using the flat end of the knife in preference to the blade to raise the skin. Having reached the hind legs, separate the latter at the femur or thigh-bone, close to the backbone, leaving the legs attached to the skin. Now skin the head-quarters close up to the tail, and separate from the body at the last vertebræ, taking care not to injure the skin. Pull the skin over the heads of the hip-joints, and now the carcass may be suspended by the hind-quarters, while the skin is stripped by pulling it gently and cutting towards the fore-quarters. The fore legs are separated from the body, as the hind ones had been, close to the shoulder-bone, and the skin pulled fairly over the head and close to the nose, when the head is separated from the body by cutting through the last vertebræ of the neck. Reynard is now skinned, the head, legs and tail being all attached to the skin, from which the carcass is separated.

The flesh is now cut entirely away from the cheek-bones, the eyes removed, the brains taken out by enlarging the occipital opening behind the cranium, the whole cleaned and supplied with a coating of arsenical paste, and stuffed with tow or wool, to the natural size.

The legs are now successively skinned by pushing out the bones and inverting the skin over them until the foot-joint is visible; every portion of flesh and tendons must be cut away, and the bone cleaned thoroughly, and a coating of arsenical soap laid over it as well as the skin. Wrap tow, or cotton, or any other suitable material, round the bone, bringing it to its natural shape, and draw the skin over it again. Do this to each leg in succession, and the body itself is ready for stuffing and mounting.

The utmost care will not prevent accidents; the fur and plumage will get sullied, and before stuffing it is well to examine the skin, for stains and spots are calculated to deteriorate its appearance. Grease or blood-spots may be removed by brushing over with oil of turpentine, which is afterwards absorbed by dusting plaster of Paris over. Macgillivray recommends that all skins, whether they are to be put away in a cabinet or stuffed, should receive a washing of spirits of turpentine sprinkled on, and gently brushed in the direction of the feathers or fur.

Not to trust too much to memory, it is desirable to measure and note the proportions of the animal before skinning, first taking the muzzle to the tail. Afterwards, from the junction of the tail to the tip. Secondly, from the middle of the shoulder-blade, or scapula, to the articulation of the femur, or thigh-bone. Thirdly, the animal being placed on its side, measure from the upper part of the scapula to the middle of the sternum—that is, to the spot where the two sides meet above, and finally from the socket of the scapula to the socket of the articulation of the femur, or thigh-bone. In addition to these, note, by measurement with caliper compasses, the size of the head, the neck, the tail, and other points which affect the shape of the animal. These measurements will serve as a guide in stuffing, and for the size of the case and length of the mounting wires. In the process of skinning, it is important to avoid penetrating to the intestines, or separating any of the abdominal muscles which lead to the intestines; any such accident would be very disagreeable, as well as injurious to the skin.

STUFFING QUADRUPEDS, ETC.

Let us suppose the animal which we intend to stuff, to be a Cat. Wire of such a thickness is chosen as will support the animal by being introduced under the soles of the feet, and running it through each of the four legs. A

piece of smaller dimensions is then taken, measuring about two feet, for the purpose of forming what is termed by stuffers a tail-bearer. This piece of wire is bent at nearly a third of its length, into an oval of about six inches in length; the two ends are twisted together, so as to leave one of them somewhat longer than the other; the tail is then correctly measured, and the wire is cut to the length of it, besides the oval. The wire is then wrapped round with flax in a spiral form, which must be increased in thickness as it approaches the oval, so as to be nearly equal to the dimensions of the largest vertebræ, or root of the tail. When finished, it should be rubbed thinly over with flour-paste, to preserve its smooth form, which must be allowed to dry thoroughly, and then the surface should receive a coating of the preservative. The sheath of the tail must now be rubbed inside with the preservative. This is applied with a small quantity of lint, attached to the end of a wire, long enough to reach the point of the tail-sheath. The tail-bearer is then inserted into the sheath, and the oval part of the wire placed within the skin of the belly, and attached to the longitudinal wire, which is substituted for the vertebræ or backbone.

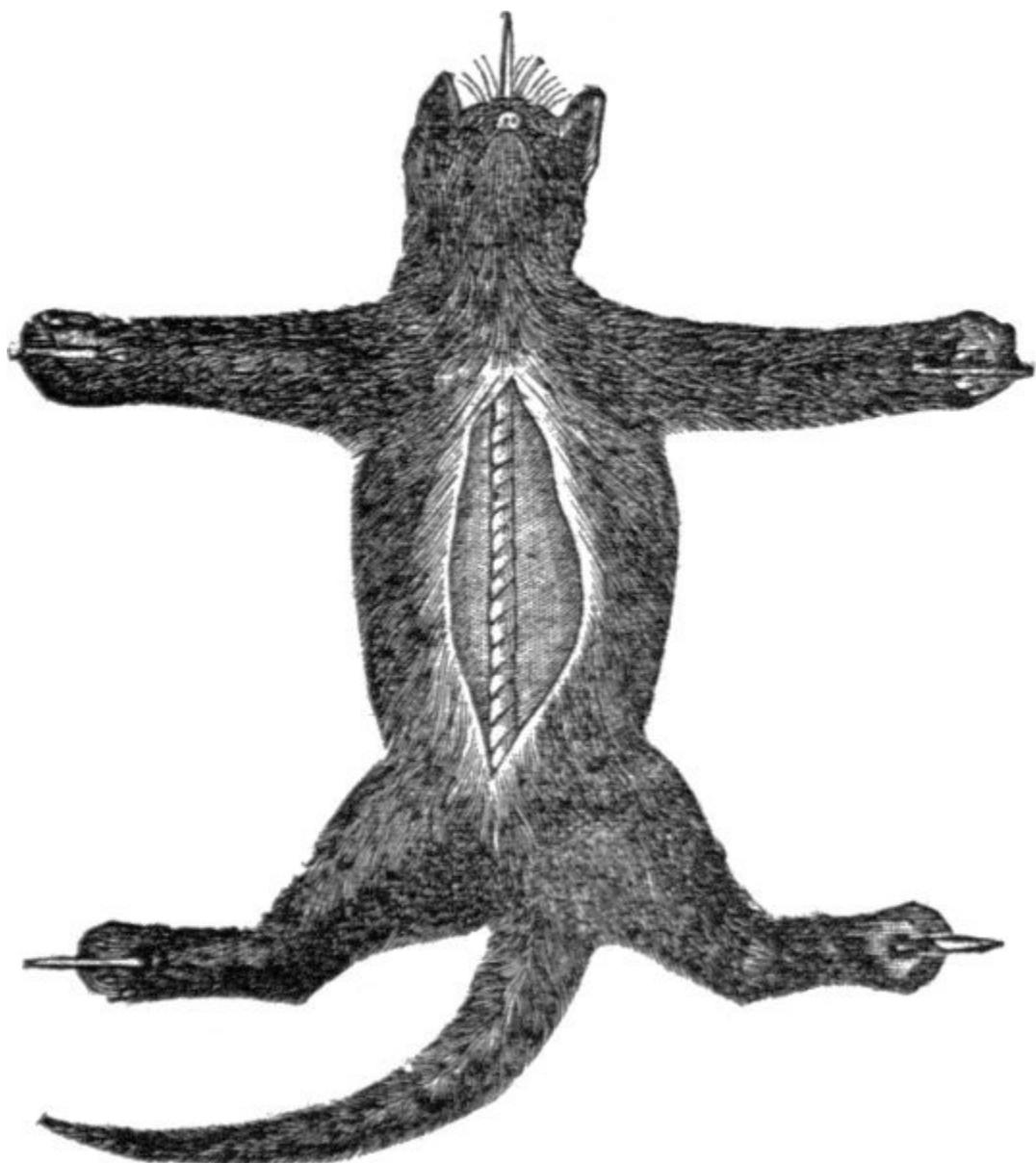
Four pieces of wire, about the thickness of a crow-quill, are then taken, which must be the length of the legs, and another piece a foot or fifteen inches longer than the body. One end of each of these is sharpened with a file, in a triangular shape, so that it may the more easily penetrate the parts. At the blunt end of the longest piece a ring is formed, large enough to admit of the point of a finger entering it; this is done by bending the wire back on itself a turn and a half, by the assistance of the round pincers. On the same wire another ring is formed in a similar manner, consisting of one entire turn, and so situated as to reach just between the animal's shoulders. The remaining part of this wire should be perfectly straight, and triangularly pointed at the extremity.

All the wires being adjusted, the operation of stuffing is next proceeded with. The skin of the Cat is now extended on a table; and the end of the noose seized with the left hand, and pushed again into the skin, till it reaches the neck, when we receive the bones of the head into the right hand. The skull is now well rubbed over with the arsenical soap, and all the cavities which the muscles before occupied are filled with chopped tow, flax, or cotton well mixed with preserving powder. The long piece of wire is now passed into the middle of the skull, and after it is well rubbed over with

the preservative, it is returned into the skin. The inner surface of the neck-skin is now anointed, and stuffed with chopped flax, taking care not to distend it too much. Nothing like pressure should be applied, as the fresh skin is susceptible of much expansion.

Observe that it is always the inner surface which is anointed with the arsenical soap.

Fig. 1.



Manner of inserting the wires in mounting a Cat.

Take care that the first ring of the wire, which passes into the head, is in the direction of the shoulders, and the second corresponding with the pelvis, or somewhat towards the posterior part. One of the fore-leg wires is then inserted along the back of the bone, and the point passed out under the highest ball of the paw. When this is accomplished, the bones of the leg are drawn up within the skin of the body, and the wire fastened to the bones of the arm and fore-arm with strong thread, or small twine. Brass wire, used for piano-forte strings, makes it more secure, and is not liable to rot. These are well anointed, and flax or tow *slivers* wrapped round them, so as to supply the place of the muscles which have been removed. To give the natural rise to the larger muscles, a piece of silver should be cut off the length of the protuberance required, and placed in the part, and the silver wrapped over it. This gives it a very natural appearance.

The mode of fixing the legs is by passing one of their pieces of wire into the small ring of the horizontal or middle supporting wire. Pursue the same plan with the other leg, and then twist the two ends firmly together, by the aid of a pair of flat pincers. For an animal of the size of a Cat the pieces left for twisting must be from five to six inches in length. After being twisted, they are bound on the under side of the body-wire with strong thread; the two legs are then replaced and put in the form in which we intend to fix them. The skin of the belly and top of the shoulders are then anointed, and a thick layer of flax placed under the middle wire. The shape is now given to the scapulæ on both sides, and all the muscles of the shoulders imitated. These will be elevated or depressed, according to the action intended to be expressed. The anterior part of the opening is now sewed up, to retain the stuffing and to enable us to complete the formation of the shoulders and the junction of the neck. This part of the animal is of great importance as regards the perfection of its form; and much of its beauty will depend upon this being well executed.

If the animal has been recently skinned, the best plan possible is to imitate, as nearly as possible, the muscles of the carcass; by which many parts will be noticed which might otherwise have been neglected. As a rule, copy Nature whenever you have it in your power.

It must be observed, as a general rule, that the wires for the hind legs of quadrupeds should always be longer than those of the fore legs.

The next thing is to form the hind legs and thighs, which must be done, as above described for the fore legs; but with this difference, that they must be wound round with thread, drawn through the stuffing at intervals, to prevent it slipping up when returned into the skin of the leg. They are then fixed, by passing the leg wires into a second ring of the center body wire, which is situated at or near the pelvis; the two ends are then bent, twisting them to the right and left around the ring: and to make them still more secure, they should be wound round with small brass wire or pack-thread; the tail-bearer is then attached in the manner formerly described.

Having completed this part of the iron work, the skin of the thighs is coated inside with the preservative, and the stuffing completed with chopped flax or tow. The whole inner parts of the skin which can be reached are again anointed, and the body stuffing completed with chopped flax. Care must be also paid not to stuff the belly too much, as the skin very easily dilates. The incision in the belly is now closed by bringing the skin together, and then sewing within and without, while attention is paid to divide the hairs, and not to take any of them in along with the thread; but should any of them be inadvertently fixed, they can be picked out easily with a point. When this is completed, the hair will resume its natural order and completely conceal the seam.

The seam should now be well primed on both sides with the solution of corrosive sublimate, to prevent the entrance of moths.

The articulations of the legs are then bent, and the animal placed on its feet, and pressure used at the natural flat places, so as to make the other parts rise where the muscles are visible.

A board is now prepared, on which to place the Cat. But before fixing it permanently, the animal should be set in the attitude in which it is intended to be preserved, and the operator, having satisfied himself, then pierces four holes for the admission of the feet wires, which must be drawn through with a pair of pincers till the paws rest firmly on the board. Small grooves are then made for the reception of the pieces of wires which have been drawn through, so that they may be folded back and pressed down in them, and not be beyond the level of the back of the board; wire nails are now driven half

in, and their heads bent down on the wires to prevent them from getting loose, or becoming movable.

The stuffer next directs his attention to the position and final stuffing of the head and neck. The muscles of the face must be imitated as correctly as possible, by stuffing in cotton at the opening of the eyes, as also at the mouth, ears, and nostrils. To aid in this, also, the inner materials may be drawn forward by the assistance of instruments, and also small pieces of wood formed like small knitting meshes.

Our next care is the insertion of the eyes, which must be done while the eyelids are yet fresh. Some dexterity and skill are required in this operation, and on it will depend most of the beauty and character of the head. The seats of the eyes are supplied with a little cement, the eyes put in their place, and the eyelids properly drawn over the eyeballs: but if rage or fear are to be expressed, a considerable portion of the eyeballs must be exposed. The lips are afterwards disposed in their natural state, and fastened with pins. If the mouth is intended to be open, it will be necessary to support the lips with cotton, which can be removed when they are dry. Two small balls of cotton, firmly pressed together, and well tinctured with the arsenical soap, must be thrust into the nostrils so as to completely plug them up to prevent the air from penetrating, as also the intrusion of moths; and besides, it has the effect of preserving the natural shape of the nose after it has dried. The same precaution should be adopted with the ears, which, in the Cat, require but little attention in setting.

We must again recommend the stuffer to see that he has sufficiently applied the preservative soap; and the nose, lips, eyes, and paws, being very liable to decay, must be well imbued with spirits of turpentine. This is applied with a brush, and must be repeated six or eight times, at intervals of some days, until we are certain of the parts being well primed with it; and, after all, it will be advisable to give it a single coating of the solution of corrosive sublimate.

The methods of stuffing, which we have pointed out in the preceding pages, are applicable to all animals, from a Lion down to the smallest Mouse. Animals of a large description require a frame-work suited to their dimensions; these he will point out in their order. There are also some

animals whose peculiarity of structure requires treatment differing a little from the ordinary course.

APES AND MONKEYS.

One of the chief difficulties to contend with, in setting up Monkeys and Apes, is the preservation of their hands and hind hands, or what we commonly call their feet; because we must not attempt to deprive these limbs of their flesh, as we never could again supply its place anything like what is in nature. The hands must therefore be dried, and then well imbued with turpentine and the solution of corrosive sublimate, repeated eight or ten times at least, at intervals of four or five days. The other parts of the stuffing should be exactly similar to that recommended for quadrupeds generally. The paws of several will require to be colored with the different varnishes, and, when dry, slightly polished with fine sand-paper to remove the gloss. The callosities, on the hinder parts of many of them, will also require to be colored, and treated in the same way as the face.

BATS.

The wing-membranes of this varied and numerous tribe do not require either wire or parchment to set them. They are very easily dried by distension. They are laid on a board of soft wood, the wings extended and pinned equally at the articulations, and, when dry, they are removed from the board.

HEDGEHOGS.

When it is wished to preserve Hedgehogs, rolled into a ball, which is a very common position with them in a state of nature, there should be less stuffing put into them than is usual with quadrupeds, so that they may the more easily bend. No wires are required in this case. The head and feet are drawn close together under the belly; then place the animal on its back in the middle of a large cloth, and tie the four ends firmly together; suspend it in the air till thoroughly dry, which finishes the operation.

If Hedgehogs are wished with the heads and limbs exposed, the usual method of mounting is adopted. The skins of Mice, Moles, etc., having a very offensive smell, it will be necessary to add a considerable portion of the tincture of musk to the solution of the corrosive sublimate with which the skins are imbued. The same applies to Badgers, Wolverenes, Polecats and Skunks, all of which are strong-smelling animals.

BEARS.

The structure of the wires requires to be different in these larger animals from any we have before described.

Procure a bar one inch thick, two inches broad, and as long as to reach horizontally from the shoulder to the connection of the thighs, or *os pubis*. A hole is bored four inches distant from one of its ends, from which a connecting groove must be formed, extending on both sides to the end of the plank next the hole; this groove must be cut out with a hollow chisel deep enough to receive the wire. The wire is then passed through it, one end of which is just long enough to be twisted with the other at the end of the plank. The wire on both sides is now pressed down into the grooves, and twisted firmly together by the aid of a pair of strong pincers. Pierce some holes obliquely into the groove and insert some wire nails into them, which must be firmly driven home, and then bent over the wire to keep them firm. The longest end of the wire should be at least eighteen inches beyond the bar, so as to pass through the skull of the animal.

The use of this bar, it will be observed, is a substitute for the central or supporting wires of the body. Two other holes are now bored into it, the one two, and the other three inches from the end which we first pierced; these are for the reception of the wires of the forelegs; and two similar holes must be made at the other extremity of the bar for receiving the wires of the hind legs.

Bears always support themselves on the full expansion of their dilated paws, so that it is necessary to bring the leg-wires out of the claws. The leg-wires are bent at right angles for a length of five inches from the upper end. These are put through the holes in the bar, and when they have passed through they are curved again. Two small gimlet-holes are then made for

the reception of smaller wire, by which the leg-wires must be bound together close to the bar. The fore-leg wires are fixed in the same manner, which completes the frame-work.

No other means are used for middle-sized animals, such as the Lion, Tiger, Leopard, etc. The stuffing is completed as in other quadrupeds.

The Walrus, Seals, and other amphibious animals of this order, are treated in the manner of quadrupeds generally, only that leg-wires are unnecessary, except in the fore-feet; the tail, which represents the hind feet, has merely to be dried and kept properly stretched in during this process, which precaution also applies to the fore-feet. They are the easiest stuffed of all animals, only the skins are very oily; they should be well rubbed with the arsenical soap, and also with the preserving powder.

The stuffing of the Walrus, and other large animals of this family, should consist of well-dried hay for the interior parts, and tow for the surface next the skin.

BEAVER, ETC.

The Beaver, Musk Rat, Common Rat, and other animals whose skins have a strong smell. These require to be plentifully supplied with the preservative. The tail of the Beaver should be cut underneath, and all the flesh removed, then stuffed with tow or chopped flax, and afterwards thoroughly dried and well primed with the arsenical soap to prevent putrefaction, to which it is very liable. It should also have repeated washings with oil of turpentine. The back should be round and short.

THE PORCUPINE.

In stuffing this animal considerable and varied expression may be given, both from the attitude and disposition of the quills. Great attention is therefore required in giving these a proper set during the process of drying. They will require to be looked at several times during the first and second day after they have been stuffed, and any of them that may have fallen out of the position required, to be adjusted.

HARES AND RABBITS.

A very pretty attitude for the Hare or Rabbit, is to have it seated in its form in an upright position, as if alarmed at the noise of dogs, etc. An oval is formed of wire and attached to the interior frame-work, after having passed one end of it through the anus, which must be passed through a hole in the board on which the animal is to be fixed. The wires of the hind legs must be forced through the posterior part of them, and also fixed into holes formed for their reception in the board.

DEER, ANTELOPES, GOATS, ETC.

These animals should be mounted on the same principles as recommended for the Bears. A different mode must, however, be adopted in skinning the animals, which the horns render necessary. It is performed in the ordinary manner until the operator reaches the neck. After cutting as near the head as possible, another incision must be made, commencing under the chin, which is continued to the bottom of the neck, or from eight to ten inches in length. By this opening, the remainder of the neck is separated from the head; the tongue is cut out, and the occipital orifice enlarged, and the brain extracted thereby. The lips are now cut as near as possible to the jaw-bones, and the operator must continue progressively ascending towards the forehead, and in this manner all the skin will be separated from the head, except at the nose, or point of the muzzle. All the muscles are next removed by the scalpel, and the skull well anointed with arsenical soap. The muscles which have been cut out are then imitated with chopped flax or cotton, which may be attached to the bones with cement. When this is done, the head must be replaced within the skin. The orifice under the neck must now be sewed up with fine stitches, so that the hair may spread over them to conceal the seam. The whole other parts of the mounting is complete as directed for the Bear.

THE DOLPHIN, PORPOISE, ETC.

The structure of these animals, as well as the other species of the first family of this order, differs but little in general structure.

In skinning these, an incision is made under the chin, and continued to the extremity of the tail; the skin is then detached right and left with the scalpel, or a sharp knife. When the skin has been cut back as far as possible, disengage the vertebræ at the tail, and this will enable the operator to detach the skin from the back; the vertebræ are now cut close to the head, and the whole carcass removed.

All this tribe have a thick layer of fat under their skin. In the operation of skinning it requires considerable dexterity to leave this fat, or blubber, adhering to the carcass. Practice alone will obviate this. When this has not been properly managed in the skinning, the only thing to be done afterwards is to scrape it thoroughly with a knife. The oil which flows from it, during this operation, must be soaked up with bran, or plaster of Paris.

There being no muscular projections in the skin of the Porpoise, there is no use for wires in mounting it. A narrow piece of wood the length of the body is quite sufficient to keep the skin stretched, and stuffed either with tow or hay. Some months are necessary to render it perfectly dry and stiff, from its greasy nature. The grease almost always leaves some disagreeable-looking spots on the skin. To remove these, and prevent a recurrence of them, powdered pumice-stone steeped in olive-oil, is rubbed thickly on the skin with a hand-brush. It is then gone over a second time with emery and oil. It is rubbed in this way till the skin has a glossy appearance, when it may be rubbed dry with a woolen cloth; and to complete the polish, a clean woolen cloth may be applied with some force to complete the gloss which is natural to the skin in a living state.

Where a very glossy appearance is wished, varnishes become necessary, but some difficulty has been experienced in getting these to remain attached to the skin in all weathers, because the humidity of rainy seasons melts gum-arabic when it is used as a varnish, and when white varnish is applied, both it and the gum-arabic fall off in pieces. To prevent the gum from falling off in this way, by its contracting, the solution should have about an eighth part of ox-gall mixed with it, and the surface of any body to be varnished should be washed with ox-gall and water before the varnish is applied, which will, almost to a certainty, present it from cracking and falling off. It must, however, be thoroughly dried before the varnish is applied.

We may here state, that an animal the size of a Fox or a Cat, may be skinned, prepared, and finally set up, in the space of four or five hours, by a person who has had a little practice in the art of Taxidermy, and that from ten to fifteen minutes are all that will be required to skin an animal of the size just mentioned.

CHAPTER II.

SKINNING, PRESERVING, AND MOUNTING BIRDS.

SKINNING.

Immediately after a bird is killed, the throat and nostrils should be stuffed with tow, cotton, or fine rags, and a small quantity wound round the bill to prevent the blood from staining the plumage; but should any get on the feathers, notwithstanding this precaution, the sooner it is removed the better, which should be effected by a sponge which has been merely moistened in water. Too much dispatch cannot be used in removing the skin, if the bird is shot in a warm climate; but, in temperate regions, the bird may be allowed to cool.

Fig. 2.



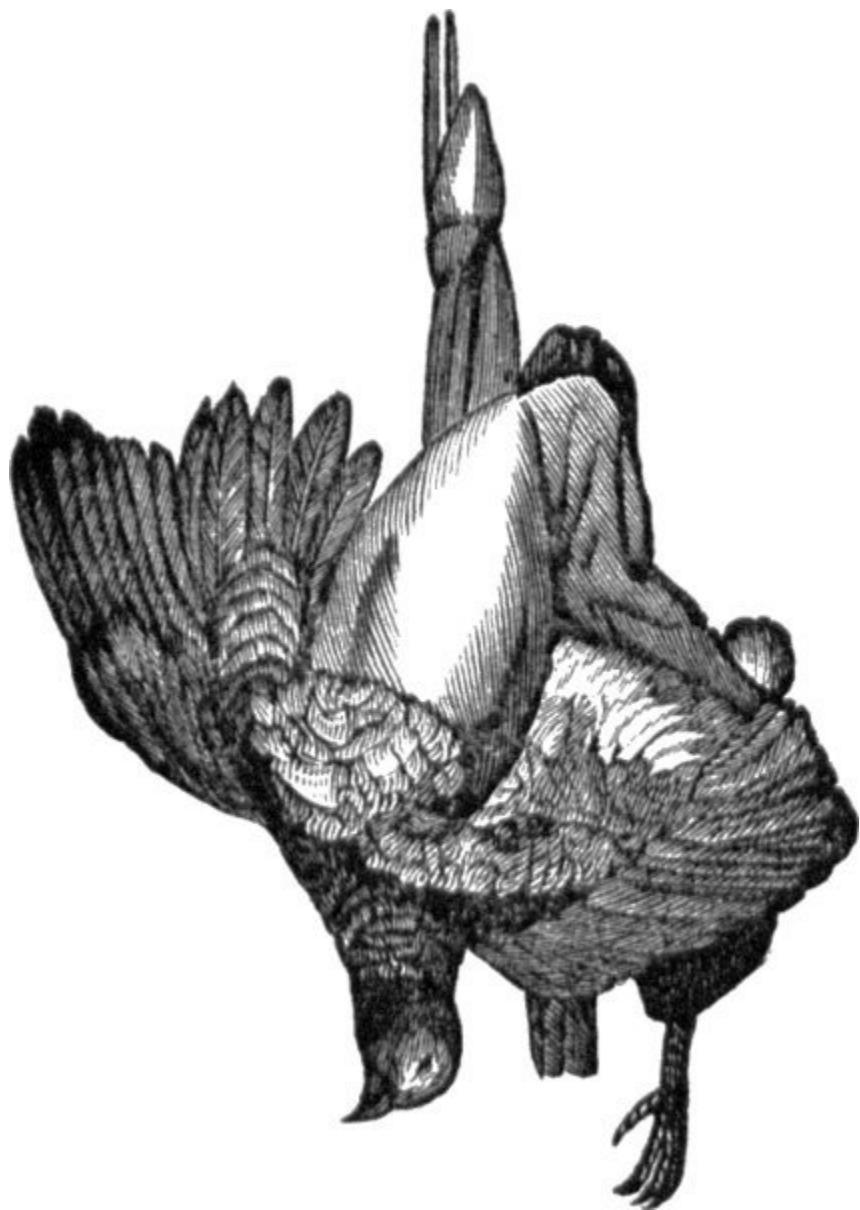
Manner of holding the hands in skinning a bird.

In proceeding to skin the bird, it should be laid on its back, and the feathers of the breast separated to the right and left, when a broad interval will be discovered, reaching from the top to the bottom of the breast-bone. (See fig. 2.)

(See fig. 2 for the manner of separating the feathers and using the scalpel.) A sharp pen-knife, or scalpel, must be inserted at the point of the bone, and cut the outer skin from thence to the vent, taking care not to penetrate so deep as the flesh, or upon the inner skin which covers the intestines. The

skin will then easily be separated from the flesh; in larger specimens, by the fingers, or, in smaller ones, by passing a small blunt instrument betwixt the skin and body, such as the end of the scalpel-handle; with this you may reach the back. The thighs should now be pressed inward, as in the common method of skinning a rabbit, and the skin turned back, so far as to enable you to separate the legs from the body, at the knee-joint. The skin is then pulled downwards, as low as the rump, which is cut close by the insertion of the tail, as shown in fig. 2, but in such a manner as not to injure its feathers. The skin is now drawn upwards the length of the wings, the bones of which must also be cut at the shoulder-joints; it is then pulled up, till all the back part of the skull is laid bare, when the vertebræ of the neck are separated from the head, and the whole body is now separated from the skin. You next proceed to remove the brain, through the opening of the skull, for which purpose it may be enlarged by a hollow chisel, or other iron instrument. The eyes must then be taken out, by breaking the slender bones which separate the orbits from the top of the mouth, in which you may be assisted by pressing the eyes gently inwards, so as not to break them. In skinning the neck great care must be taken not to enlarge the opening of the ears, and not to injure the eyelids. The whole of the flesh is next to be removed from the under mandible.

Fig. 3.



Bird suspended for skinning.

Several species will not admit of the skin being thus pulled over their heads, from the smallness of their necks; some Woodpeckers, Ducks, etc., fall under this description; in which case a longitudinal incision is made under the throat, so as to admit of the head being turned out, which must be neatly sewed up before stuffing. The flesh from the head, wings, legs, and rump, must then be carefully removed with a knife, and the cavities of the skull filled with cotton or tow. The whole inside of the skin, head, etc., must be well rubbed with arsenical soap, or preserving powder, or spirit of turpentine, or the solution of corrosive sublimate. When it is wished to stuff

the bird, it may now be immediately done, as it will easily dry, if in a warm climate; but in low, damp countries, it will require artificial heat to do it effectually.

When the skins are merely wished preserved, the bones of the legs and wings should be wrapped round with cotton or tow, so as to supply the place of the flesh; the skin is then inverted and hung up to dry, after using the arsenical soap, as above directed; before doing which, in larger birds, a thread or small string may be drawn through the rump, and passed up to the inside of the neck, and drawn through the bill, to prevent the head from stretching too much by its own weight. In larger specimens, where cotton or tow is not easily to be met with, well-dried hay may be used.

The incision for removing the skin is frequently made under the wings. This may be done with marine birds to advantage. The Penguins and Divers may be skinned by making the incision in the back.

The tongue should either be kept in the mouth, or sent home separately with the birds.

The greatest care must be taken to prevent the fat and oily matter, so common to sea-birds, from getting on the feathers; pounded chalk will be found an excellent absorbent for applying to these birds.

In sending home specimens of birds, they should be each wrapped in paper, and closely packed in a box; and camphor, preserving powder, and strong aromatics, strewn amongst them, to prevent them from being attacked by insects; and they ought to be kept in a very dry part of the vessel.

It is of the utmost consequence to know the color of the eyes and legs of birds, and these things should be carefully noted the moment they are killed; and it should also be mentioned whether they are male or female; such a memorandum ought to be attached to the birds by a ticket. The season of the year in which the bird is killed, must also be mentioned. It is also of much consequence to have good skeletons, and, for this purpose, the carcasses may be sent home in a barrel, either in spirits or a strong solution of salt and water.

Mr. Salt, while in Abyssinia, packed his bird-skins between sheets of paper, and in the same manner as a *hortus siccus*, or herbarium, and they reached

England in perfect safety, and made excellent specimens when set up. In warm climates, the boxes should be well closed, and the seams filled with warm pitch on the outside, to prevent the intrusion of insects; and the inside should be supplied with camphor, musk, or tobacco-dust, which will prevent the attacks of the smaller insects.

Till practice has given facility to the operator, it will assist in keeping the feathers clean, if, as he opens the skin of the breast, he pins pieces of paper or linen cloth on the outside, but after a few trials this will be unnecessary.

Some of the marine fowls are so fat that there is much trouble in separating it from the skin, and in warm weather, great attention will be required to prevent it from running on the feathers. As much as possible should be scraped off, in the first place, with a blunt table-knife or palate-knife, and a quantity of powdered chalk applied, to absorb what remains, which, when saturated with the oily matter, should be scraped off and a fresh supply used, after which a much larger proportion of the preserving powder should be applied than in other birds which are not fat.

When shooting on the sea-coast, if the ornithologist is not provided with these requisites for absorbing the oil, which flows quickly from any wounds of the skin, he will find dry sand a tolerable substitute.

If, however, after every precaution, the oily matter should get on the feathers, the sooner it is removed the better, as, in birds where the plumage is white, if it is allowed to become hardened it will produce a very disagreeable appearance; and, besides, render that part particularly liable to the attack of insects. There are several effectual methods of removing the greasy stains; the first, safest, and best, is, by taking a quantity of diluted ox-gall—or, where it cannot be commanded, sheep's-gall, or that of any other animal—mix it with about double the quantity of water, and apply it with a sponge to the place which the fatty matter has touched, when it will immediately remove it. The next is by using a solution of salt of tartar, or potash, or soda. This must be made very weak, not exceeding half a tea-spoonful to a cup of water, which will have the same effect as the gall. Whichever of these are used, the place must be immediately afterwards washed in pure water, so as to leave none of the gall or alkaline substance remaining. The gall has a gummy tendency, and will glue together the fibers

of the feathers, and, besides, it has a great attraction for moisture, and, in humid weather, will become damp, and therefore produce mold; the other alkaline substances must also be used with much caution and quickness, because they have the power of changing the colors of the plumage, so that they are most useful in white plumage, and therefore should only be used on colored feathers, where gall cannot be procured.

One general observation applies to the preservation of all animal skins, which is, they must be made perfectly dry, so that the sooner they are exposed to a free current of air the better; and unless they are speedily and thoroughly dried, the skin will become putrid and rotten, and the hair or feathers will consequently fall off. If a skin is properly dried, soon after it is killed, it will keep a considerable time without any preservative whatever, only it will be the more liable to be attacked by insects afterwards.

The following excellent general directions for skinning are given by Mr. Waterton:—"While dissecting, it will be of use to keep in mind, that in taking off the skin from the body, by means of your fingers and little knife, you must try to shove it, in lieu of pulling it, lest you stretch it.

"That you must press as lightly as possible on the bird, and every now and then take a view of it, to see that the feathers, etc., are all right.

"That when you come to the head, you must take care that the body of the skin rest on your knee, for if you allow it to dangle from your hand, its own weight will stretch it too much.

"That, throughout the whole operation, as fast as you detach the skin from the body, you must put cotton immediately betwixt the body and it, and this will effectually prevent any fat, blood, or moisture from coming in contact with the plumage.

"As you can seldom get a bird without shooting it, a line or two on this head will be necessary. If the bird be still alive, press it hard, with your finger and thumb, just behind the wings, and it will soon expire. Carry it by the legs, and then, the body being reversed, the blood cannot escape down the plumage and through the shot-holes. As blood will have often issued out, before you have laid hold of the bird, find out the shot-holes, by dividing the feathers with your fingers, and blowing on them; and then, with your

pen-knife, or the leaf of a tree, carefully remove the clotted blood, and put a little cotton on the hole. If, after all, the plumage has not escaped the marks of blood, or if it has imbibed slime from the ground, wash the part in water, without soap, and keep gently agitating the feathers with your fingers, till they are quite dry. Were you to wash them, and leave them to dry by themselves, they would have a very mean and shriveled appearance.

“In the act of skinning a bird, you must either have it upon a table, or upon your knee; probably you will prefer your knee, because, when you cross one knee over the other, and have the bird upon the uppermost, you can raise it to your eye, or lower it at pleasure, by means of the foot on the ground; and then your knee will always move in unison with your body, by which much stooping will be avoided, and lassitude prevented.”

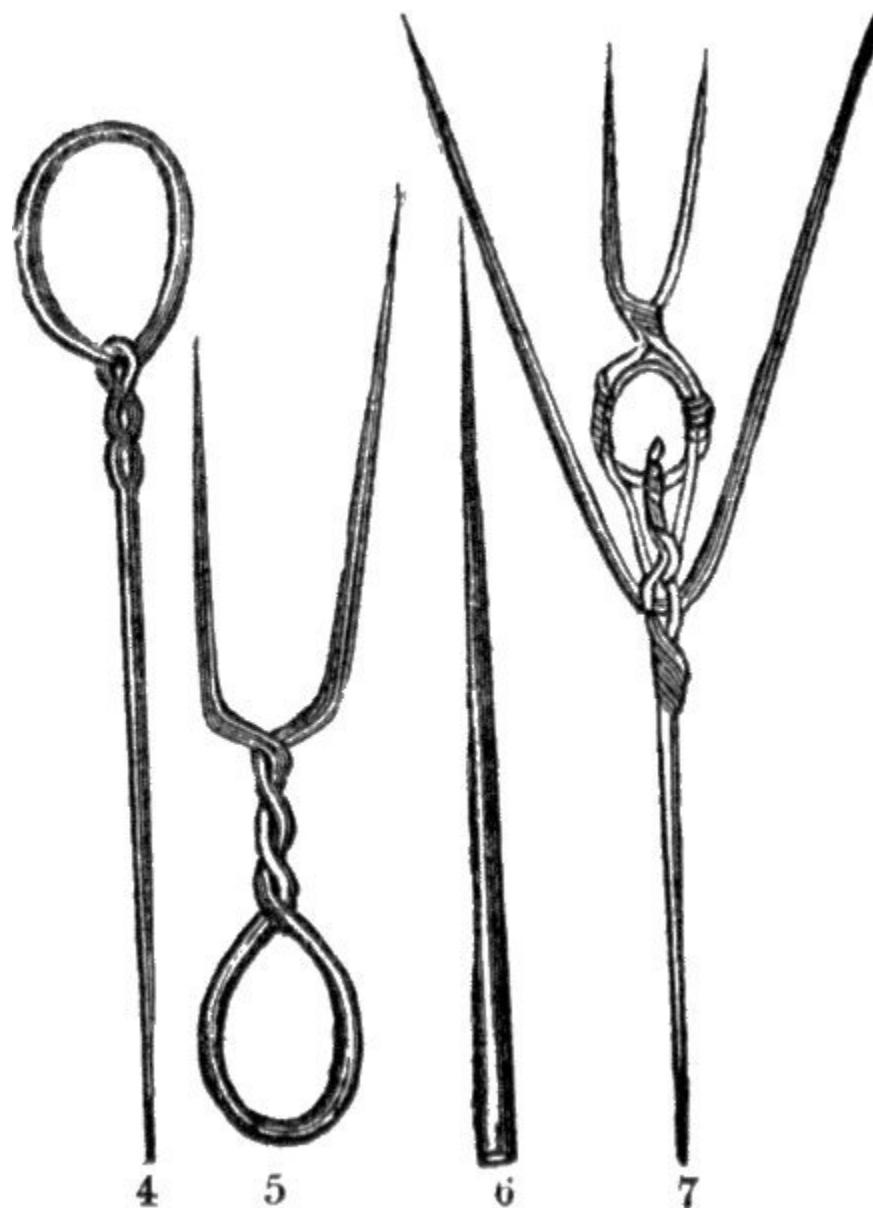
STUFFING BIRDS.

The first thing to be done in stuffing is to replace the skull, after it has been well anointed with the arsenical soap, and washed with the solution of corrosive sublimate inside. The thread with which the beak is tied is taken hold of by the left hand, and the head is repassed into the neck with the forefinger of the right hand, while the thread is pulled on the opposite side; and we are careful that the feathers, at the margin of the opening, do not enter with the edges of the skin. The bird is now laid on the table with the head turned towards the left hand, and the legs and wings adjusted to their proper situation. A flat piece of lead, about a pound in weight, is laid on the tail, while the feathers of the margins of the opening are raised by the forefinger and thumb of the left hand, to prevent their being soiled. The inside of the neck is now coated with the arsenical soap; flax is stuffed into it, but not too tightly. The back and rump are anointed, and the body should then be stuffed with tow, to about a third of the thickness required, so that the wire may have a sort of cushion to rest on.

Four pieces of wire are then prepared, of the thickness proportionate to the size of the bird to be stuffed. The center-piece should be somewhat longer than the body of the bird. At about a fourth of its length a small ring is formed, by the assistance of the round pincers or pliers, and the other end is pointed with a file. This wire is oiled, and introduced across the skull, and passed into the neck through the center of the flax or tow with which it is

stuffed—the ring being situated toward the anterior part of the skull, for the purpose of receiving the points of each of the wires that are passed through the feet and thighs.

Fig. 4 to 7.



4, the oval and head-wires of a bird separated; 5, the tail-bearers separated; 6, a leg-wire separated; 7, the body-wire, the head-wire, the tail-bearer and legs connected.

The following is the mode in which this performance is effected: A hole is bored with a brass awl, the caliber of the wire which it is intended to use. The wire, which is to continue in the leg, is passed across the knee, and brought out interiorly, and, placing it into the ring above mentioned, the same operation is performed on the other side. The extremities of the wires of the legs, and the end of the central wire beyond the ring, are all twisted together with flat pincers, and then bent towards the tail. The tail-bearer is next formed, which consists of the fourth piece of wire, with which an oval is formed, by twisting the two ends two or three turns, so that they may form a kind of fork, with the oval nearly the length of the body of the bird; the two points of the fork must be sharpened with a file, and near enough to enable them to enter the rump, through which they must pass, and their points will be concealed by the rectrices, or large straight tail-feathers, while the oval is within the body of the bird. If the bird is large, the tail-bearer must be firmly attached to the interior wires, by twisting a small wire several times round both. But unless the bird be large, it may remain quite free.

All the parts of the skin at which we can come must be thoroughly rubbed with preserving soap, the rump in particular, which should, besides, be soaked with the solution of corrosive sublimate. The stuffing is now proceeded with, by inserting chopped flax or tow, till it has attained its proper dimensions. The skin is brought together and sewed up, while we take the greatest care to separate the feathers at every stitch.

The orbits of the eyes are next finished, by inserting, with small forceps and a short stuffing stick, a small quantity of chopped cotton, while attention is paid to round the eyelids properly. The glass eyes are now inserted, taking care to place them properly under the eyelids. But, before fixing the eye, a little calcareous cement must be used, to prevent them from coming out. If any part of the nictitating membrane is visible below, it must be pushed up with the steel point.

The stuffing of the bird being now completed, the next thing is to place it either on a branch, or, if a bird which does not sit on trees, on a piece of plank; whichever of these it is, two holes are bored for the reception of the wires, which have been allowed to protrude from the soles of the feet, for fixing the bird (See fig 8.) These, of course, are pierced in such situations as

are necessary for the attitude or position of the legs. The wires are put through these holes, and twisted so as to secure the bird in its position. The attitude of the bird will, of course, depend upon the fancy and taste of the operator, and ought to be in conformity with the manners of the birds in a living state.

The wire frame-work, above described, is the most simple of any in its construction, and is better adapted for small than large birds. Indeed, it will hardly suit those of the larger species. The following is another method of constructing the frame-work, which may be used either in large or small birds:—

Like the former, it is constructed of four pieces of wire. The center-piece should be double the length of the bird; it is bent at a third of its length of an oval form, and twisted two turns, the shortest end being passed into the oval, and then raised against the longer end, so as to produce a ring at the end, outside of the oval, large enough to admit the two wires which pass from the feet to the inside of the bird. It is now twisted a second time, and firmly united to the longer end, which ought to be straight, with a sharp point, effected by means of a file. As before directed, it is rubbed with oil, and forced through the stuffing of the neck. It ought to be so constructed, by measurement, that the oval part of the wire shall be in the center of the body inside. The wires of the feet and legs, as before directed, ought to be straight and pointed, and passed through the soles of the feet as before. When the point has penetrated, the other end of the wire may be bent, so that by means of it we may be able to assist in forcing up the remainder of the wire. The two internal ends of the foot-wires are twisted together, and curved within, so as to pass through the small circle or ring of the middle branch above the oval, to each side of which they are now attached with a piece of small string.

The tail-bearer is constructed on the same principles, and attached in the same manner, as before described, and the latter apparatus is introduced after the neck and back are finished in the stuffing.

This practice of introducing the neck-wire, after the neck is stuffed, was first adopted at the Jardin des Plantes at Paris, and is now invariably adopted in that establishment in preference to introducing it before the neck

is stuffed. The neck of a swan or other long-necked and large birds, are even done so. It is unquestionably the best plan which has hitherto been discovered, as it preserves the cylindrical shape of the neck.

MR. BULLOCK'S METHOD OF STUFFING BIRDS.

Mr. Bullock, of the London Museum, Egyptian Hall, had another method of arranging the wires, which, after what we have already said, will be easily comprehended by a reference to figure 8, where we have given a figure of his mode. After the skin is taken off and prepared, different-sized, nealed, iron wires are procured, according to the size of the bird they are to support. The skin is laid on its back without stretching it; cut two pieces of wire, the one rather longer than the bird and the other shorter, so as not to reach to the head of the bird; twist them together, sharpen the ends of the longer by means of a file, and pass one end through the rump and the other through the crown of the head, near the base of the bill. Care must be taken not to extend the neck beyond its ordinary length—a very common fault in most preservers. Lay a little tow along the back of the skin for the wire to rest on, then take two other pieces of strong wire and file them to a point at one end; these are passed through the soles of the feet and up the center of the leg-bone, or tarsus. When within the body, they are to be fastened to the first wires by twisting them together, which, when accomplished, may be supposed to represent the backbone. The wire should be left two or three inches out of the soles of the feet, to fasten them in a standing position, as before directed. Two smaller wires are then passed through the wings, as in the legs, and afterwards fastened to the back-wires a little higher up than the leg-wires, taking care that no part of the skin is to be extended beyond its natural position.

Fig. 8.



Mr. Bullock's method of inserting the wires in setting up a bird.

A NEW AND EASIER METHOD OF BIRD SKINNING AND STUFFING.

A fair specimen being obtained, take common cotton wadding, and with an ordinary paint-brush stick plug the throat, nostrils, and, in large birds, the ears, with it, so that when the skin is turned no juices may flow and spoil

the feathers; you must then provide yourself with the following articles: A knife of this kind is very common; a pair of cutting pliers, a pair of strong scissors, of a moderate size; a button-hook, a marrow-spoon, and a hand-vise. With these, a needle and thread and a sharpener of some kind, to give your knife an occasional touch, you are prepared, so far as implements go. Then provide yourself with annealed iron wire of various sizes; some you may buy ready for use, some not; but you can anneal it yourself by making it red hot in the fire, and letting it cool in the air. Common hemp is the next article, cotton wadding, pounded whitening, and pounded alum, or chloride of lime; as to the poisons which are used, they will be spoken of by and by. You should also have a common brad-awl or two, and some pieces of quarter-inch pine whereon to stand the specimens when preserved, if to be placed as walking on a plane; if not, some small pieces of twigs or small branches of trees should be kept ready for use, of various sizes, according to the size of the bird; something of the form of Fig. 9. Cedar, or common laurel cut in December, will be found to answer best, but this must be regulated by fancy and the requirements of the case; oak-boughs are sometimes of a good shape.

Fig. 9.



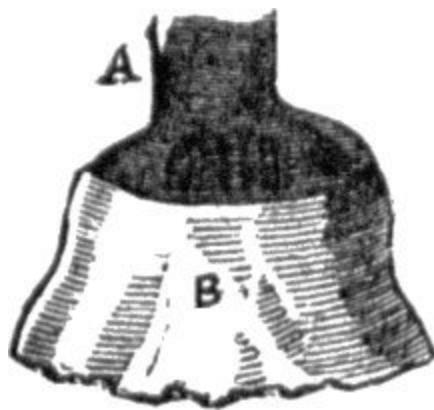
Branch for mounting a bird.

The best time for preserving specimens is in spring, because then the cock birds are in the best feather, and the weather is not too warm. In mild weather three days is a good time to keep a bird, as then the skin will part from the flesh easily. If a specimen has bled much over the feathers, so as to

damage them, wash them carefully but thoroughly with warm water and a sponge, and immediately cover them with pounded whitening, which will adhere to them. Dry it as it hangs upon them slowly before the fire, and then triturating the hardened lumps gently between the fingers, the feathers will come out almost as clean as ever. To test whether the specimen is too decomposed to skin, try the feathers about the auriculars, and just above the tail, and if they do not move you may safely proceed.

Lay the bird on his back, and, parting the feathers from the insertion of the neck to the tail, you will find in most birds a spare space. Cut the skin the whole length of this, and, passing the finger under it on either side, by laying hold of one leg and bending it forward, you will be able to bring the bare knee through the opening you have made; and with your scissors cut it through at the joint; pull the shank still adhering to the leg till the skin is turned back as far as it will go: denude the bone of flesh and sinew, wrap a piece of hemp round it, steeped in a strong solution of the pounded alum, and then pull the leg by the claw, by which means the skin will be brought again to its place.

Fig. 10.



After having served both legs alike, skin carefully round the back, cutting off and leaving in the tail with that into which the feathers grow, that is, the "Pope's nose." Serve the wing-bones the same as the leg, cutting them off close to the body, and turn the skin inside out down to the head. The back of the skull will then appear, and you will now find it of advantage, as soon as you have got the legs and tail free, to tie a piece of string round the body, and hang it up as a butcher skins a sheep. Make in the back of the skull a cut of the annexed form, with your knife, which you can turn back like a

trap-door, and with the marrow-spoon entirely clear out the brains; A representing the neck, and B the skin turned back. Having done this, wash the interior of the skull thoroughly with the alum, and fill it with cotton wadding. The next operation requires care and practice—namely, to get out the eyes. This is done by cutting cautiously until the lids appear, being careful not to cut the eye itself, and you can then, with a forceps, which you will likewise find useful, pull each from its socket; wipe the orifice carefully, wash it with the alum solution, and fill it with cotton wadding. Cut off the neck close to the skull, wash the stump, and the whole of the interior of the skin with the alum, and the *skinning* is done.

Fig. 11.

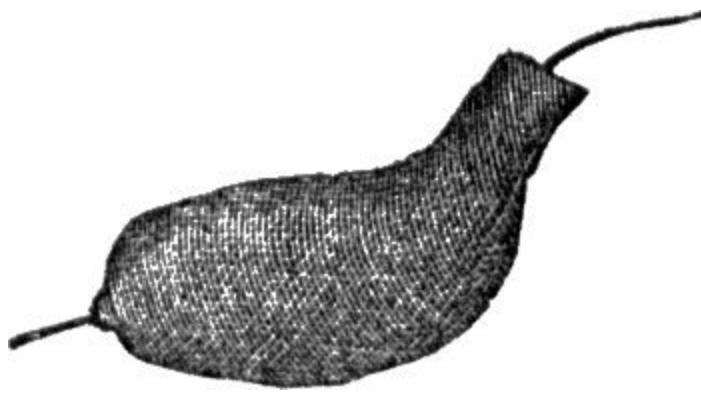


Wire bent for inserting.

Now comes the stuffing. The ordinary mode used by bird-preservers is a simple one, and answers very well; there is a French method, however, which has its advantages, and will be adverted to hereafter. Take a piece of the wire suitable to the size of the bird—that is, as large as the legs will carry—and bend it into the following form, *a* representing the neck, *b*, the body, and *c*, the junction of the tail, allowing sufficient length of the neck for the wire to pass some distance beyond the head, and being sharpened at each end, which may be done by obliquely cutting it with the pliers. Wind upon this wire hemp to the side of the bird's body, which you should have lying by you to judge from, and it will present something of this appearance. You can shape it with the hand, but be careful not to make it the least *too large*; and, after you have finished it to your satisfaction, you may singe it, as the poultreer would singe a fowl, which will make all neat; but be particular to wind the hemp very tight. Then take the skin, lay it on the table on its back, and pass the wire at the head into the marrow where the neck is cut off, through above the roof of the mouth, and out at one nostril, and draw it up close to the skull; turn the skin back, and draw it down over

the hemp body, and pass the wire spike, protruding at the lower end, through the flesh upon which the tail grows, about the center, and rather below than above. The skin may now be adjusted to the hemp body, and sewn up, beginning from the top of the breast, and being particularly careful always to take the stitch from *inside*, otherwise you will draw in the feathers at every pull. At first sew it very loose, and then, with the button-hook, draw it together by degrees.

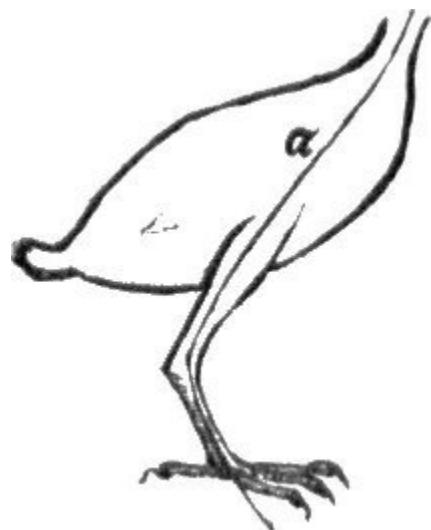
Fig. 12.



The hemp wound on the wire.

With the pliers cut two lengths of wire, long enough to pass up the legs and into the neck, and leave something over to fasten the bird by to the board or spray upon which it is to be placed. The next operation requires some address and great practice, namely, the passing the wire up the legs. This is done by forcing it into the center of the foot, and up the back of the legs, into the hemp body, through it obliquely, and into the neck, until it is pretty firm.

Fig. 13.



In doing this, you must remember the ordinary position of a bird when alive, and, therefore, instead of passing the wire the whole way *within* the skin of the leg, when you get to the part where you have cut off the bone—that is, the knee-joint—pass it through the skin to the outside, where the knee would come naturally in the attitude of standing or perching—it makes little difference which. This is essential, because, if the wire be passed the whole way *inside* the skin, it produces a wrong placing of the legs. Fig 13 will illustrate this, *a* representing the line in which the wire should run. The bird is now stuffed, and you may at once place it upon a spray or board, as the case may be. In placing a bird upon a spray, the first joint should be bent almost on a level with the foot; and in placing a bird on a board, one leg should be placed somewhat behind the other. If the wings are intended to be closed, as is usually the case, bring them into their place, which may be done by putting the fingers under them, and pressing them together over the back; you may then pass a needle, or large pin, of which you should have a good supply by you, through the thick part of the upper wing into the body, and so by the lower wing, and if you allow these to protrude, you may fasten to one of them a piece of thread, and wind it carefully and lightly round the body, which will keep the feathers in their places, and this thread should be kept on for a fortnight or three weeks, until the bird is dry. The tail should be kept in its place, also, for the same time, by a piece of thin wire bent over it, thus:

Fig. 14.



The only thing now to do is to put in the eyes. The color, of course, depends on the bird, and these you may buy at any fishing-tackle store. If you do not use eyes too large, you will find little difficulty; the juice of the lids will act as a sufficient cement. As to the mounting, I shall say nothing about that now, but shall only advert shortly to a French method of preserving which is more difficult, but has the advantage of superior firmness. It is this: Measuring from the insertion of the neck to the tail, make a wire frame of this form, the measure taken being from A. to B.

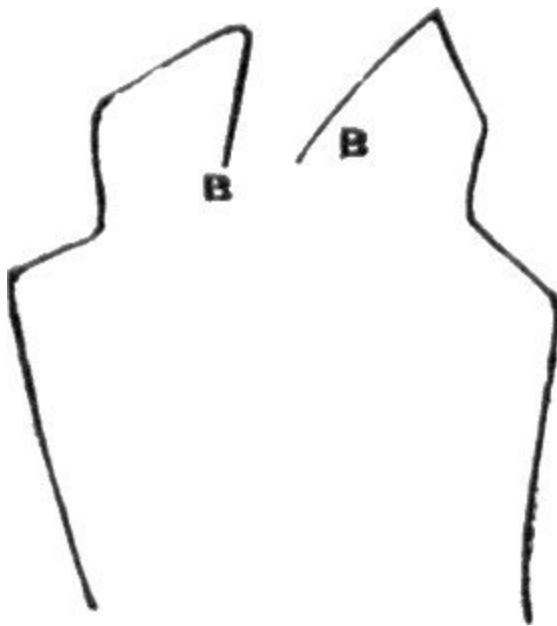
Fig. 15.



Wire Used in French Method.

Upon this end wind hemp for the neck only, and place in the skin in the same way as before directed, only that, instead of one wire being passed through that in which the tail grows, it is a fork that is passed through it. Having formed this frame, fit on to it two legs, thus: and after the frame itself is in the skin, pass these from the *inside* down each leg, instead of from the outside, and fasten them on to the frame with the pliers, by twisting the ends, B B, round the frame, C, in the first figure.

Fig. 16.



The Wire Legs.

This will make all firm, and you can then fill the body with cut hemp and sew up. One word as to the other preparations used by bird preservers. These are either corrosive sublimate or regulus of arsenic, which is yellow and of a consistence like butter. As I have said before, in cold weather, when there are no flies about, alum will do perfectly well; in warm weather either of the two others may be used. I should prefer the former—corrosive sublimate—as the other is “messy,” and the chief object is to dry up anything which can be attacked by flesh-seeking insects. When you have finished your bird you can lay the feathers with a large needle—it is as well to have one fixed in a handle and kept for this purpose—and, tying the two mandibles of the bill together with a piece of thread until the whole specimen has hardened and dried, the work is done.

CHAPTER III.

THE ART OF MOUNTING BIRDS, DRIED SKINS, FEATHERS, ETC.

MOUNTING IN GENERAL.

We will suppose that a proficiency, from practice, has been attained in the art of bird-preserving, according to the instructions given. The proficiency in preserving may apply only to the preservation and the form, great and necessary things, no doubt, as preliminaries; but, like matter without manner, of little avail alone. For attitude, I would say, as has been said to many a young artist, go to Nature, and there you will find an original in perfection. Would you make a willow-wren look like a willow-wren, watch him as he there hangs upon the weeping birch, or stands on a bough peering in quest of food. Each bird has its own manner, and if you cannot hit the manner, or make your stuffed skin so far amenable as to assume the attitude, it is either ill-stuffed, or you want the requisite knowledge of that which you should copy.

BIRD PINNED UP.

Having fixed on the attitude, it now only remains to put the feathers into their natural order as smoothly and regularly as possible; and to keep them in this state they should be bound around with small fillets of muslin fastened with pins as represented in fig. 17. The bird should then be thoroughly dried, by placing it in an airy situation, if in Summer; or if in Winter, near the fire, but not so close as to affect the natural oil contained in the feathers. The want of proper attention in drying ruins many a fine specimen; if long kept damp putridity ensues despite all preservatives, when the skin will become rotten, and the feathers will soon fall off; besides, the mold and long-continued damp change the chemical properties of the preservatives used.

Fig. 17.



After the bird has been thoroughly dried, the fillets are removed; the wire which protruded from the head is cut off as close to the skull as possible, with the wire cutting pincers elsewhere shown. It must then be attached to a circular, or other shaped piece of wood, with the generic and specific name and sex, as well as its country and locality attached to it, on a small ticket, when it may be placed in a museum.

Young hands commonly suppose that a bird should stand bolt upright, with the legs almost perpendicular, or at right-angles to the perch. This is a great mistake, and never to be found in Nature. Do we stand rigid, like a foot-soldier on drill? Does not a bird, as well as ourselves, accommodate itself to the thing on which it rests? Assuredly it does; for birds do not, as a young bird-stuffer endeavors to do, find always a perch to rest upon in the plane of the horizon. It therefore follows that, as he keeps himself upright, his legs must accommodate themselves to his perch. So in the ground-birds there is a gentle slope backwards from the hind toe, the balance being preserved in both cases by throwing the body forward in proportion. It is not uncommon to see birds preserved with wings and tail spread. Now, ordinarily speaking, this is very objectionable, because very unnatural.

Fig. 18.



Fig. 19.



Fig. 20.



Proper positions of birds.

A bird preserved is supposed to represent a bird in a state of repose; that is, not in flight; the only modification allowable being with regard to those birds whose manner it may be to have the wings more or less open on occasions; thus the falcon tribe, supposing they are represented as devouring a quarry, or two birds toying with each other. It may be that a bird essentially aerial, like the swift, or perhaps some of the terns or the frigate bird, may be represented as actually on the wing. In this case, of course, the wings must be spread; and this is best done by passing a wire, not too thick, from the base of the quill-feathers on the under side alongside the bone into the body, where it should be carefully and coaxingly inserted towards the tail until you feel that you have a pretty good hold. You may then pass it carefully under the longest quill-feather, and through the back of the case, and fasten it by bringing it back again through and clinching it, concealing it so by the oblique position of the bird that it is not detectable. It is obvious that by passing the wire alongside the bone, you may bend the wings to any angle you please.

With regard to the case, there are two methods; one a bell-glass, which, glass being now so reasonable, is certainly a very pretty and reasonable way of mounting, but inapplicable to birds which are to be placed on a wall, or to be represented flying; although this may be managed by attaching one wire from the point of the wing to a twig sufficiently firm, which it will scarcely appear to touch, if managed adroitly. It is likewise indispensable that a bird for a shade should be stuffed so well as to look nicely in all positions. One thing must always be remembered, *do not have your case a shade too large*, just clear the object so as not to stint it for room; and in flat

cases this applies chiefly to depth, for it should have sufficient light, or it will not look well. Wooden cases should be made as slight (in thickness) as is consistent with firmness; well-seasoned white deal is best; and the case should be formed of back, top and bottom, open at the front and sides, and at each corner of the front two slight deal supports, rabbited on their inner edges, and presenting on the whole this appearance.

Having the case prepared, it should be papered with ordinary demy paper on the top and back within, and, when the paste is dry, washed over carefully with size and whitening, tinted with a little stone-blue; some add some touches of white subsequently to represent clouds, the ground representing the air; some also paste a landscape on the back, but this must be good, or you had better have plain color. The bird to be placed in this case is either perching, standing or flying. For the latter, directions have been given. As to the two former, the perch must be firmly fixed in the small piece of flat wood upon which it previously stood, and put in upon it, the wood being fastened to the bottom of the case, either by screwing from below, from above, or gluing with stout glue, or by passing wire through two holes in the bottom of the case and the wood, and clinching above. In this case, or in screwing from below, let the wire or the screw into the wood, and putty over, and so if the bird is represented standing. The bird being fixed, the next thing is the decorating or "weeding," as it is technically called, and here we enter upon a subject so entirely of taste and fancy, that no fixed rules, as to the disposition, can in all cases be given. One rule applies equally to this as to landscape painting, viz., that there should always be a compensation of objects. That is, if you have a turf of grass on one side which rises towards the top of the case, there should be something in the lower opposite corner to strike the eye, but not to rise above midway at furthest, and the ground, or floor, should not be over-furnished with moss, etc. After the bird is fixed, the whole bottom should be carefully glued over with thin glue, taking care, where the bird's feet are at the bottom, not to touch the toes with the glue. Some fine-sifted sand or gravel should then be sifted over it, and it will adhere wherever the glue has touched; for this purpose a small tin shovel is best, something in this form, and about two inches wide by four long, with a handle in proportion, which can be made to order at any tin-man's for a trifle.

Everything used in “weeding” should be baked in a slow oven, otherwise spiders’ eggs and minute creatures, which are pretty sure to be contained in it, will make their appearance after the case is closed in the disagreeable form of destroying your specimen. Moss, etc., by being slowly dried, will also keep its color better. Yellow moss, found on the roofs of old barns, and dark gray of the same species, are very generally useful: and where yellow moss cannot be had, the white or gray may be colored with chrome, and looks as well. Water-plants fade, being more or less succulent, and hence a little common water-color with gum will be used with advantage and look less artificial than oil paint, which is often used. Fern looks very pretty as an adjunct for heath-birds, but it should be dried gradually and carefully, when *quite* full grown, and a small touch of light green, permanent white forming a portion of it, will give it a freshness and more natural appearance. Grass in seed (not in flower) of various kinds is also a very pretty addition; but bird preservers have a habit of using dyed grass, and yellow and red *Xeranthymum*, or Everlasting, which is certainly to be avoided, and indeed anything which is unnatural. If it is wished to introduce a lump of earth, or an apparent bank, a piece of thick brown paper, bent to the requisite shape, and glued over and covered with sifted sand or gravel, has a very good effect; but insects and butterflies, or artificial flowers, unless they are extremely natural, should certainly be avoided. Regard should also be had to the season at which the bird is usually seen.

For instance, Summer birds are, of course, surrounded by green and living objects, but Autumn or Winter visitants by decaying or dead herbage. It has often been made an experiment to represent snow, but it is difficult to obtain anything white enough, and at the same time of a crystalline character, which, of course, it should be. Potato farina nicely dried, mixed with Epsom salts pounded very fine, does not make a bad substitute; but the real difficulty lies behind, namely, in fixing it, and, more than all, the least damp takes very much from its appearance, if it does not destroy the effect, and hence we must have recourse to mineral aid, and any very white mineral powder mingled with pounded glass is perhaps best. It is unnecessary to say that the herbage upon which it is meant to rest should be touched all over with paste, not glue, and the white mixture shaken over and left to dry. What will heighten the effect very much, if prettily executed, is a black landscape with a dark leaden sky and nearly black earth mingled with moss.

To represent water, a small piece of looking-glass, surrounded with moss, etc., answers very well. The bills and legs of birds should be always varnished, and where the natural color fades after death it should be restored by a thin coat of oil-color of the required shade. The bird being fixed and the case garnished, nothing remains but to put in the glass; this is in three pieces, one for the front and a piece at each end. This can be pasted in with very strong paper round the edge, advancing sufficiently over the glass to hold it. In doing this it is not necessary to be very particular to avoid pasting the glass, as after it is dried it can be wiped clean with a damp cloth. The last operation is a very simple one, and done in a few minutes. You must procure some black spirit-varnish, which you can make yourself by dissolving the best black sealing-wax in spirits of wine, and should be kept corked; when this is good it acts as paint and varnish at the same time, and dries as fast as it is put on. One or two brass rings screwed on at the top of the back of the case will finish the bird, and if the case be nicely and closely made, there is no limit of time to which the preservation of the specimen may not extend.

METHOD OF MOUNTING DRIED SKINS.

We must now say something respecting the setting up of skins which have been preserved by travelers, and sent home from distant parts.

The general method is exactly the same as in stuffing recent specimens. There are, however, some preliminary steps which it is necessary to know.

If the specimen sent home has been partially stuffed, our first business is to undo the stitches, if it has been sewed—which was an unnecessary process. We then remove the whole cotton or tow from the inside, by the assistance of forceps, and from the neck with a small piece of wire, twisted or hooked at the end. Having finished this, small balls of wet cotton are placed in the orbits of the eyes, and the legs and feet are wrapped round with wet cotton or linen rags. A *damp* cloth is then thrown over the bird, and it is allowed to remain in this state till next day. The neck and body are then filled with wet linen or cotton, and it will be ready for commencing setting up in four or five hours.

The eyes are now put in, as directed in the recent subjects, and then stuffed in exactly the same manner. Some difficulty will, however, be experienced with respect to the leg-wires, and it will require more time and care, from the dryness of the legs, to get the wire to penetrate. Having proceeded so far as to get the bird generally formed, the wings are next adjusted; this also is frequently difficult, owing to the stiffness of the tendons and want of proper attention in skinning and drying them at first. Indeed, with some of the South American birds, a proper adjustment of the wings is found impracticable, owing to the attempts of the native Indians of Guyana, who seldom dispose them properly.

When these skins—frequently exceedingly valuable from their rarity—are undone, to be remounted, it is oftentimes found utterly impossible to get the wings to take a natural set, in which case there is no other remedy but cutting them off close to the body, and fixing them anew. The scapulars are separated, they are softened with damp cloths, and then wrapped up with bands of sheet lead, to give them a proper set. When we have got them in their natural shape, they must be fixed to the sides by cement and cotton, and a long pin through each, with the head concealed amongst the feathers. The scapulars, which we have cut off, must then be cemented on, and they will effectually cover the joining of the wings. The bird being now arranged, and all the feathers adjusted, it is wrapped round with small bands of fine linen or muslin, and set aside till thoroughly dry.

Should any feathers be disengaged during the mounting, they must be kept, and, when the bird is dry, we can replace them in their proper situations with a pair of forceps, after they have been touched on their shafts with the cement; the feathers around the place in which we intend to insert them must be held up with the probing-needle.

If any of the feathers are deranged in mounting, and have got a wrong set, the only way to remedy the defect is to pull them out with forceps, and reinsert them with cement.

OF MOUNTING BIRDS, FEATHER BY FEATHER.

Rare birds are frequently received from foreign countries, the skins of which are in such a state of decay, that it is impossible to mount them by the

ordinary process above described. The only way in which they can be preserved, is to mount them feather by feather, which, however, is a very tedious method. It is as follows:

Procure a piece of soft pliable wire, such as is used by bell-hangers; or take some of the ordinary wire used, and make it red-hot in the fire, and allow it to cool gradually, when it will become quite pliable. Take five pieces of this, of different lengths, and form them into the skeleton of a body; namely, two for the back, one on each side, and one to represent the breast-bone. Imitate the shape of the bird's body as nearly as possible. The wires must be roughened with a file, at the place where all the wires meet, at the neck and rump; and first wrap the place next the neck round with strong thread or fine brass wire. Two pieces intended for the back must bend gently downwards, and be gradually separated from each other towards the center, and brought together again at the place intended for the rump, whither they must intersect each other, and be twisted two or three times, to keep them in their place; they are then spread out as supports for the tail; the side-pieces are next formed, so as to represent the natural bulge of a bird's body, and attached to the rump; the piece representing the breast is then formed, joined at the rump, and afterwards continued as long as the other tail-pieces, to support the center of the tail; while at the front extremity a piece is left, for the purpose of forming a neck to which to attach the head. Two leg-wires are attached to the side-wires, being rolled round them for several turns, making a frame-work the shape of the bird.

After this body has been properly formed, it must be wrapped round with tow-sliver, and the neck thickened to its required dimensions. When this is accomplished, the head, legs, wings and tail are softened in the usual manner; the eyes are then fixed in with some cotton introduced into the orbits, with a little of the cement. The wings and tail are now placed on a table, with a flat leaden weight above each, to restore them to their natural shape. The leg-wires are then passed through the legs, commencing at the top, and bringing them out at the soles of the feet, and left with a piece extending beyond the claws.

The tail is now fixed on, by first attaching to it a quantity of cotton with the cement, and, when dry, it is fixed to the part intended as the rump.

The feet of the bird must be fixed into a piece of wood, as a perch, the ends of which must be left some inches beyond the body. The end next to the tail is fixed into a table-vise, with the belly upwards, and the head pointing toward the operator. The feathers are now put on, commencing under the tail, or crissum, with what are termed the under-tail coverts; a coating of cement must be previously laid on, to attach the feathers with. It is proceeded with upwards to the breast, and finally the length of the neck, taking care to put the proper feathers on their respective sides, as the side-feathers have all an inclination to one side. The bird is now turned with the back up, still keeping the head towards the stuffer; and the wings are fixed on with cement, and pins forced through the beards of the feathers to conceal the heads. When this is done put on the feathers of the rump, and proceed upwards, as has been done with the belly. After reaching the top of the neck, the head is then fixed on with some cotton immersed in the cement, and allowed to dry before attempting to put on the feathers.

In this mode of mounting a bird there are several things which must be attentively adhered to; these are—first, not to put the feathers too thick, for there is a danger of running short; secondly, all the shafts of the feathers must have a small bit cut off the tip, so as to admit the cement and to give them a firmer hold; and thirdly, that the feathers should all occupy their respective parts; and fourthly, that they should be arranged as they are in nature on these parts, as the disposition of every part of the body is peculiar to itself.

At first, this mode of setting up birds will be found a difficult task, but, by a little practice and experience, it will become familiar and comparatively easy, although it will always be found a tedious process. We have seen some specimens set up in this way, which we could hardly detect from those mounted in the ordinary manner.

Besides what we have already said concerning the stuffing and preparing of birds, there are many details connected with particular species which demand our attention, and which can only be described as regarding that species. It will, however, be impossible for us to enter into all these minutely, but only give a few examples as general guides. We shall take these in systematic succession.

PRESERVATION OF COLORS.

In the preservation of the feathers of Birds, little else is required to prevent the dissipation of their colors than to keep them as much as possible from air and light. These two agents, which were indispensable to their beauty and perfection in a living state, now exercise their influence as destroyers, and that influence will sooner or later work its ends according to the quality, texture, or color of the object with which it is contending. The feathers are now deprived of two agents, which in a living state contributed to their vigor and their beauty, namely, the internal circulating juices which they received from the body of the animal, and the external application of oil by the bill of the bird, supplied from a gland which is placed over the rump of all birds.

The colors of the rapacious tribes are not so evanescent as those of many others, as they, for the most part are composed of intense browns and blacks, which are not so easily absorbed by light or air, so that they continue for a very long period without any sensible difference. There are, however, certain other points which are liable to almost immediate change of color after the death of the animals, and these are the cere and skin of the legs and feet, and the naked skin on the heads and necks of Vultures and their congeners. We shall treat of these individually.

Now, as all these colors which we have described are liable to change, immediately after death, it is evident that considerable nicety will be required to give the preserved specimen the appearance of nature. These must, therefore, be supplied artificially with the varnish colors, which we have particularly described in their proper place, as also the combinations for the formation of compound colors. The reddish-brown color mentioned, of which the fold is composed, must be touched by a mixture of the scarlet varnish, with a little powdered burnt umber, and the blue streaks with which it is traversed, colored above with cobalt blue. All the varnish colors have a tendency to shine, which, it will be evident, is not the character of any part of the skin, or caruncle of the bird described. As soon, therefore, as it is thoroughly dry, which will be in about an hour, the whole surface must be gently rubbed with very fine sand-paper, which will completely remove the gloss and give the appearance of nature.

Some nicety will be required in painting betwixt the hairs, but it can be easily managed with a little caution. Sometimes these hairs are liable to become brown, in which case they can be touched with the black varnish.

As these birds are inhabitants of warm climates, some care is requisite, after killing them, to prevent decay; the tendons of the legs should be extracted to prevent their being attacked by moths, and their place supplied by some cotton and preservatives. The tendons are extracted by means of a longitudinal incision made behind the tarsus. The edges of this incision can easily be brought together when the bird is under the process of preparation.

CHAPTER IV. COLLECTING AND PRESERVING BIRDS' EGGS AND NESTS.

Few objects of Natural History are more interesting than the nests of birds. To the reflecting naturalist, they open up a wide field for inquiry. Speaking of the examination of birds, in the exercise of their mechanical arts of constructing nests, Professor Rennie says: "This work is the business of their lives—the duty which calls forth that wonderful ingenuity which no experience can teach, and which no human skill can rival. The infinite variety of modes in which the nests of birds are constructed, and the exquisite adaptation of the nest to the peculiar habits of the individual, offer a subject of almost exhaustless interest." The number and variety of the eggs of birds are curious subjects of contemplation, and should be carefully noted whenever opportunity offers. They are as essential to the personal history of the species as any other part of our inquiries.

The eggs are emptied of their contents by making a very small hole at each end with a point. By blowing at one of the ends, the contents will escape by the other, unless the young has been already formed; in which case a larger hole must be made in the side of the egg, and the contents removed with a small hook. The hole should then be stopped up by pasting a little gold-beater's leaf over it. The eggs are then either returned to their nest, in which they ought to be cemented, or should be fixed down by one side to cards, with the name and locality attached.

The best manner of conveying loose eggs to a distance is to put some cotton at the bottom of the nest, and then another layer above them. The nests should all be put up in separate boxes, if possible, and so packed that the pressure of the lid may not injure the eggs, or a box with several compartments should be used, taking care that each is carefully marked. It would also be of consequence to have the nests attached to the branches, with those species which build on trees, which will enable us to trace the ingenious means employed by those little animals in constructing their

habitations. In sending home specimens from a foreign country, the seams of the box should be covered by pitched cloth, to protect them from the influence of moisture.

To preserve the shells of eggs, first take care to clear them of their contents; get a small, fine-pointed common syringe, such as is sold in toy-shops, and inject the specimen with water until it comes out quite clean. When an egg has been partly hatched or addled, the removal of the contents generally includes that of the internal membrane or pellicle: this makes the shell weaker. When the specimens are quite clean internally, and have become dry (which will be in a day or two), take the syringe and inject them with a strong solution of isinglass (with a little sugar-candy added to prevent its cracking); blow this out again whilst warm. Let the shell get dry, and then wash the outside with a soft wet cloth to remove saline particles, dirt from the nest, etc. This method varnishes the inside, and the first specimen on which it has been tried was the before-mentioned hedge-accentor's egg, which is to this day as bright in color as a fresh specimen.

Also in a pair of nightjar's eggs, of which species the delicate gray tint is particularly evanescent, one was injected in the manner described, and the other was not; in the first the gray is still perfectly defined, in the other it has entirely disappeared. Eggs which have lost their internal pellicle become strengthened by this process, and those which have not lost their color greatly improved.

CHAPTER V.

SKINNING, PRESERVING, AND SETTING UP REPTILES, FISHES AND MOLLUSCOUS ANIMALS, ETC.

TORTOISES AND TURTLES.

SKINNING.—The first operation is to separate the back and breast-shells with a strong short knife or chisel. If the force of the hand is inadequate, a mallet may be used, taking care not to strike so hard as to crack the shell.

These two bony plates being covered by the skin, or by scales, the scapula, and all the muscles of the arm and neck, in place of being attached to the ribs and spine, are placed below, from which cause the tortoise has been termed a retroverted animal. The vertebral extremity of the scapula is articulated with the shield, and the opposite extremity of the clavicle with the breast-plate in such a manner that the shoulders form a ring for the passage of the windpipe and gullet.

After the turtle is opened, all the flesh which adheres to the breast-plate, and also to the upper shell, is removed, while attention is paid to the parts as above described. The head, fore-feet, and tail are skinned as in quadrupeds; but none of these must be removed from the upper shell, but left attached.

All the fleshy parts being removed, the shells are washed out with a sponge, and carefully dried. They are then slightly rubbed with the arsenical soap.

STUFFING.—Wires are now passed through the middle of the legs, after the skin has been rubbed with the preservative. The skull is returned to its place, and the whole of the head, neck, and legs stuffed with chopped flax or tow. The parts of the skin which have been cut are then sewed together. The back and breast-plates are then united by four small holes, being bored at their edges, and united by strings or small wires. The junction of the

bones may then be attached with the cement, colored so as to correspond with the shell.

If the calipash is dirty, it may be cleaned with a slight solution of nitric acid and water; afterwards cleanly washed, oiled, and then rubbed with a woolen rag, to give it a polish.

CROCODILES AND LIZARDS IN GENERAL.

SKINNING.—All this tribe are skinned in the same manner as quadrupeds. Care, however, is required in skinning the tails of the smaller species, as they are very liable to break. The skins being of a dry nature, require but little of the preservative. After they are thoroughly dried they will keep a very long time without decay.

STUFFING.—Stuff them as directed for quadrupeds. They admit of but little variety of attitude. The small species are exceedingly apt to change color in drying; which must be imitated with the colored varnishes, and afterwards dimmed with sand-paper. To keep them in their natural colors, they should be preserved in spirits.

The skins of such as are glossy should be varnished after they are perfectly dry.

SERPENTS IN GENERAL.

SKINNING.—In skinning serpents there is some nicety required, to cut them so as not to disfigure the scales; the opening should be made in the side, commencing at the termination of the scales; and they should on no account be divided, as upon their number the species is mostly determined.

It is a very frequent practice to send home serpents without the head, which renders them quite unfit for any scientific purpose. This proceeds from the fear of receiving poison from the fangs. But there is not the slightest danger of being affected, as these can easily be cut out by means of pincers. The head should be cleaned and the brain removed, in the same manner as recommended for birds and quadrupeds, the skull anointed and then returned into the skin.

When the skin is removed, it may be rolled up and packed in small space. The simplest way to preserve small species is to put them in spirits, which must not be too strong, as it will destroy the colors.

Mr. Burchell, in his four years' journey through Africa, glued the skins of the smaller serpents perfectly flat on paper, which preserved the size of the animal, and the skin retained all the beauty of life.

STUFFING.—The skin, if not recent, must be first softened in the manner recommended for birds. A piece of wire is taken, the length of the animal, which must be wrapped round with tow till it is of a proper thickness, and above the whole a spiral band of sliver should be carefully wrapped. It is then placed inside of the skin, and sewed up. The eyes are placed in as directed for quadrupeds and birds. When dry, give the serpent a coat of varnish, and then twist it into any attitude wished. A favorite and striking one is to have it wound round some animal, and in the act of killing it.

FROGS AND TOADS.

SKINNING.—The mouth is opened, and the first vertebræ of the neck is cut. The whole inside of the mouth is cut out with scissors. The two jaws are next raised up, and the skin is pushed back with the fingers of the right hand, while the body is drawn back in a contrary direction with the other hand, and the whole body is then drawn out at the mouth. The legs are then returned to their proper place.

STUFFING.—The simplest method of stuffing these animals is with sand. A small funnel is placed in the mouth, and pour in well-dried sand. When full, a small piece of cotton is pushed into the throat, with some of the cement, to keep the sand from escaping on moving the animal.

The Frog is then placed on a board, and in an attitude. When quite dry, give it a coat of varnish. When this has perfectly dried, very small perforations are made under the belly with the point of a needle, and the sand allowed to escape, leaving the body in its natural form.

These animals are liable to change of color from drying, and should, therefore, be painted with the varnish to their natural hues. There is less

difficulty with Toads in this respect, as they are usually of a brown color, and not liable to much change.

They may be perfectly preserved in spirits.

FISHES.

The best method of securing the scales and colors of Fish, is, as soon as they are caught, to apply cambric or tissue paper to them, which will soon dry and adhere firmly; the body may be then taken out and the skin dried. When the skin is to be stuffed, roll it in a moist cloth, which will not only render it pliable, but also soften the tissue paper, so as it can be removed, when the colors will be found to be much brighter than by any other method with which we are yet acquainted.

LAMPREYS, EELS, AND OTHER FISH OF SIMILAR FORM.

These species may be skinned in the same manner as Frogs and Toads, by drawing the body through the mouth.

OF SKINNING FISH IN GENERAL.

The fish should be procured as fresh as possible, more particularly if it is one of those on which the scales are loosely attached. Lay it on one side and cut the gills with a pair of scissors; then introduce a little tow or piece of sponge into the place to prevent the blood from flowing during the process of skinning; let the fins be raised and gently extended, and two pieces of paper, something the shape of each, be placed under them, only extending a little beyond them. Coat the paper with a weak solution of gum-arabic, and put a piece of similar size on the top of the fin; by pressing these gently they will adhere and dry in a few minutes; these will keep the fins extended, and preserve them during the operation of stuffing. When these are dry, take a piece of tissue paper or thin silk, and press it gently on one side of the fish. The natural glutinous matter which covers the scales will be sufficient to make it adhere firmly; it will soon dry and form a strong protection to the scales during the skinning. Without this precaution the skin could not be removed from mullet, sea beaver, etc., without the scales being much

disfigured, and losing many of them. Indeed, in such fishes, it is not amiss to put on an additional coating of paper with gum-water. This will not only secure the scales, but will also assist in keeping the proper form of the fish, by preventing distention.

When these papers are thoroughly dry, turn the fish on a soft cloth, with the uncovered side upwards, and open it with sharp scissors from the bottom of the tail-fin to nearly the point of the snout, keeping as correctly on the lateral line as possible, which can be seen in most fishes. The cheek should be afterwards cut open, so that the flesh may be removed from it; cut also the flesh from the opposite cheek, and supply its place by cotton. The skin must now be detached from the flesh, which will require some care at first. It must be commenced at the head, and separating it downwards with the assistance of a knife, and the fin-bones must be cut through with scissors. The spine must now be cut through close to the head, and also at the tail, and the body removed.

All the animal matter having been completely removed from the skin, the inside must be wiped dry, and the preservative applied in the same manner as directed for birds and quadrupeds. Great care is necessary to prevent it from being too much distended.

IN SHARKS and LARGE FISHES, an incision is made below the head, and extended to the fin of the tail; the skin is then separated on each side with a scalpel, cutting back as far as possible, so that the vertebræ may be cut close to the head. The tail is then skinned. The head is pushed inwards, and the skin passed over it above, and all the cartilage cut carefully away. Care must be taken not to enlarge the branchial openings too much, which would render it necessary to sew them up again, and it is not easy to hide a seam in a fish's skin.

DIADON, TETRADON, and BALISTES, and their congeners, are opened by the belly. The ostracion is enveloped in a skin, which consists of a single piece, the tail of which only is free and flexible. The opening in the belly must not be large; the tail must be opened, the flesh cut away, and stuffed with cotton.

STUFFING.

The skins, being properly anointed, are filled with tow or cotton. This must be so managed that there will be no prominences on the outside of the skin, which in fishes, is smooth and even for the most part. When properly filled, they must be sewed up, and set aside to dry in the air, but not exposed to the rays of the sun. In a few days, the papers with which the fins were extended are taken off, by damping them with a sponge. The glass eyes are now introduced, after filling the orbits with cotton and a little cement to secure them in their places. The skins may then be coated with turpentine varnish.

SHARKS.—In stuffing these large fishes, it is necessary to use a stick for a center support. This must also enter the head, through the opening of the throat. If it is intended that the specimen shall be suspended from the ceiling, wire-hooks must be fastened into the wood. From these must be placed upright wires, so that they penetrate the skin, and pass through the back. Let the whole internal surface of the skin be well rubbed with the preservative. The body is then stuffed to its full size, and afterwards sewed up. The stuffing of the head must be completed through the orbits of the eyes, and also by the mouth. This finished, the glass eyes are inserted, as in other animals, and fixed by means of cement.

Many species of fish have semi-transparent cartilages connected with the eyes. These must be imitated with gum-arabic and powdered starch, as well as the cornea of the eyes.

The skins of all fish, which are similar to that of sharks, must be well supplied with spirits of turpentine, after they are mounted, more particularly the head and fins; but as they are not glossy, they do not require to be varnished.

When the fins are strong, it is necessary to keep them extended by means of a wire introduced through them.

In the Diadons, the chief thing to be attended to, beyond what we have stated, is, to take care that the spines, with which their skins are beset, are not broken or depressed in any way.

Salmon, Trout, Tench, Carp, Pike, etc., are very easily preserved, as the scales are firmly attached to the skin; and although they become somewhat

dim from drying, their colors and brilliancy are considerably restored by means of varnish, if applied before they are thoroughly dried.

After a lapse of time, the varnish will rise into little scales; to remove these, nitric acid, diluted in water, must be applied to the whole external surface, which has the effect of completely taking off the varnish, or at least of raising it from the skin, which, when allowed to dry, can be wholly removed by rubbing it with a small brush. It may then be varnished again; when dry, it will ever afterwards continue quite solid.

What is above recommended will apply to almost all fishes.

LOBSTERS, CRABS, ETC.

In this class are included crabs, lobsters, and their congeners. These animals are all protected by a coriaceous covering, or shell, which is easily preserved, although there is considerable difficulty in preserving the colors of some species.

The flesh must be extracted from the large claws of lobsters and crabs by breaking the smallest possible piece from their points and introducing a small, crooked wire; in the smaller claws the flesh must be allowed to dry, and to facilitate this extremely small perforations should be made in opposite sides of the shell by means of a sharp, triangular awl, so as to allow the air to pass through it.

In lobsters the branchiæ and all the intestines must be cut away; the latter is effected by separating the body from the lower parts, and then extracting the internal parts with any sharp instrument; it should then be dried and cemented together, after being well anointed with the preservative. In crabs, the body, with all the limbs attached, is pulled separate from the back shell and the whole fleshy matter carefully picked out and preserving powder and the solution of corrosive sublimate applied to the different internal parts. In drying lobsters, crabs, etc., they should be exposed to a free current of air, but not to the sun's rays, as it reddens the shells of crustaceous animals.

It need hardly be mentioned, that before applying the preservatives, the shells should be well washed with cold water.

The Hermit-Crab always takes possession of the shell of some turbinated Univalve as its domicile. These are easily preserved by pulling out the animal after it is dead. An incision is made in the soft tail of the animal, and the contents allowed to run off; it is then filled with cotton and imbued with the preservative; some cement is then put on the tail and the animal returned to its shell, which completes the operation of preserving.

In sending home crustaceous animals, the larger species should be emptied of their fleshy matter, which, however, is not necessary with the smaller species; they should be packed in middling-sized cases, and each wrapped in separate papers, with a thick bed of cotton or flax between each. In Lobsters, and the species which are allied to them, great care must be exercised in preserving the tentacula or feelers which emanate from their heads, as these become very brittle after they are dried. In proceeding to set up specimens which have been sent home, they should be immersed in *cold* water for some time, to give pliability to the tentacula and other parts, without which it will be impossible to set them up in any way without their breaking.

Mr. Bullock recommended that Crabs and all other crustaceous animals should be immersed in corrosive sublimate and water for an hour previous to their being put into attitudes.

When the joints become loose they are in general attached by glue, but the cement is much better.

N. B.—On no account whatever use warm water in cleaning crustaceous animals, as it is certain to change their colors.

CHAPTER VI.

PRESERVING SPIDERS, GALLY-WORMS, AND INSECTS.

SPIDERS.

The general directions which we shall give respecting Insects, hold good as to Spiders, only we must mention there is considerable difficulty in preserving the bodies of Spiders, which generally, in a very short time, shrink into a shapeless mass. To prevent this, the body should be pricked with the triangular awl and the contents pressed out; it should then be stuffed with very fine carded cotton or down, which can be pushed in by a pricker, blunted a little at the point. When properly distended, the small aperture should be filled up with a little cement, or a solution of gum-arabic. The legs of the larger species, such as the Bird-catching Mygale and the Scorpions, are also liable to shrink, and should be stuffed in the same manner as that of the body.

In those species of Spiders which we have thus prepared, and whose colors are rich and likely to be affected by the action of the atmosphere, we must endeavor to arrest its progress by immediately imbuing the animal, after it is set up, with the solution of corrosive sublimate, and in an hour after with a thin coating of a very weak white-spirit varnish; for this purpose, take a tea-spoonful of the ordinary white-spirit or elastic varnish, and add to it two tea-spoonfuls of spirit of wine; apply this wash with a fine camel-hair brush, which will quickly dry, and have a strong tendency to preserve the color. The varnish, being thus reduced in strength, will not leave any gloss on the insect, nor will it be at all perceptible.

Mr. Samouelle, author of "The Entomologist's Useful Compendium," in speaking of preserving Spiders, says: "The best preserved specimens that I have seen are those where the contents of the abdomen have been taken out and filled with fine sand. I have preserved several in this way, and find it answers the purpose."

Mr. Donovan makes the following observations on the preservation of Spiders:

“To determine whether some species of Spiders could be preserved with their natural colors, I put several into spirits of wine; those with gibbous bodies soon after discharged a very considerable quantity of viscid matter, and therewith all their beautiful colors; the smallest retained their form, and only appeared rather paler in the other colors than when they were living.

“During the course of last Summer, among other Spiders, I met with a rare species; it was of a bright yellow color, elegantly marked with black, red, green, and purple; by some accident it was unfortunately crushed to pieces in the chip-box wherein it was confined, and was, therefore, thrown aside as useless; a month or more after that time I observed that such parts of the skin as had dried against the inside of the box retained the original brightness of color in a considerable degree. To further the experiment, I made a similar attempt, with some caution, on the body of another Spider, and, though the colors were not perfectly preserved, they appeared distinct.

“From further observations I find, that if you kill the Spider, and immediately after extract the entrails, then inflate them by means of a blow-pipe, you may preserve them tolerably well; you must clean them on the inside no more than is sufficient to prevent moldiness, lest you injure the colors, which certainly, in many kinds, depend on substance that lies beneath the skin.”

Scorpions, and all the Spider tribe, may be sent home in spirits, which will preserve them perfectly, and when taken out and dried, they will be found to have suffered nothing from their immersion. We have seen some specimens sent up, after being sent home in spirits, which rivaled any which have been preserved in a recent state. The animals of this class are particularly liable to the attacks of insects, particularly in warm countries, on which account the mode of transporting them and keeping them in spirits is, perhaps, superior to all others. If, however, they are set up in a warm climate, they should be well soaked with the solution of corrosive sublimate, made according to the recipe of Mr. Waterton.

For the setting up of this class, see the directions for preserving insects.

INSECTS.

Every country of the world is replete with this extensive and interesting class of beings, whose forms are infinitely diversified, and whose species are the most numerous of any class in the animal kingdom.

Before any attempt is made to collect insects, certain apparatus must be provided, not only to enable us to secure them, but also to preserve them after they are caught.

First, then, we must be provided with a quantity of wooden boxes, from 18 to 20 inches long, 15 to 17 inches wide; and two inches deep. These should have well-filled lids, with hinges, and fastened by a wire catch, or small bolt. The bottom should have a layer of cork, about the sixth of an inch in thickness, which should be fixed down with very strong paste, made according to our recipe; and also some wire nails, to prevent it from springing. Over the cork should be pasted white paper. The box should be anointed inside with oil of petroleum. If that cannot be procured, make an infusion of strong aromatic plants, such as cinnamon, aloes, thyme, laurel, sage, rosemary, or cloves, and wash the inside with it. A small packet of camphor should be wrapped in a piece of rag, and deposited in a corner of the box.

We must also be provided with a quantity of *Insect pins*, of different sizes, corresponding with the size of the insect. The pins used for setting should be longer than those which are taken to the field.

Bottles, with mouths from an inch and a quarter to two inches in diameter, must also be procured, and these must be three-fourths full of spirits, such as weak brandy, rum, gin or whisky.

HUNTING-BOX.—We must besides have what is termed a hunting-box, for carrying in our pocket, when seeking after insects. This should be made of strong pasteboard or chip, for lightness, or, if this is no consideration, of tin. It must be of an oblong-oval shape, rounded at the ends, for the convenience of the pocket. It should be from eight to ten inches long, four to five inches wide, and two and a half to three inches deep. It must have a layer of cork both in the bottom and top of the lid, inside, for attaching

insects to, when caught during the day. The larger insects are placed at the bottom, and the smaller ones on the lid.

THE ENTOMOLOGICAL.—We next procure a net, constructed similar to a bat-fowling net. This is either made of fine gauze or coarse muslin; it may either be green or white—the latter is the best for observing small insects which may be caught; the green, however, is better adapted for catching Moths. The net-rods should be made of hickory, beech, hazel, or holly; they ought to be five feet in length, quite round, smooth, and tapering to an obtuse point; the oblique cross-piece at the point should be of cane, and fitted into the angular ferule; the rod must be divided into three or four pieces, so that it may be taken asunder and carried in the pocket; the upper part of each joint must have a ferule affixed to it, for the purpose of articulating the other pieces. Each joint should have a notch or check to prevent the rod from twisting.

The net itself, must have a welting all around it, doubled so as to form a groove for the reception of the rods. In the center of the upper part or point it must have a small piece of chamois leather, so as to form a kind of hinge; this must be bound round the welting, and divided in the middle, so as to prevent the cross pieces from slipping over each other; it shows about four inches of the gauze turned up, so as to form a bag; there are strings for the purpose of passing through the staple, to which the net is firmly drawn on each side. When the net is used a handle is to be held in each hand.

If it is intended to take insects on the wing, by means of this net, for which it is admirably adapted, it may be folded together in an instant. If the gauze is fine enough, and preserved whole, even the smallest insect cannot escape. It may be also applied in catching Coleopterous Insects, which are never on the wing, as well as Caterpillars. When used for this purpose the Entomologist must hold it expanded under trees, while another must beat the branches with a stick. Great numbers of both insects and larva will fall in the gauze, and by this means many hundreds may be captured in a day.

Another method is to spread a large table-cloth under trees and bushes, and then beat them with a stick. An umbrella reversed has frequently been used for the same purpose. Bose, the celebrated naturalist, used this last method

—he held the umbrella in the left hand, while he beat the bushes with the other.

THE HOOP OR AQUATIC NET.—This net is used for capturing Aquatic Insects, which are either lurking at the bottom, swimming through the liquid element, or adhering to plants. It may also be successfully used in sweeping amongst grass and low herbage, for Coleopterous Insects, and others which are generally to be found in such situations. The socket for the handle may be made of such dimensions as will answer the second joint of the Entomological net-rod, which will save carrying another handle; or a walking-stick may be made to fit it.

A VIAL.—This may either be made of tin or crystal, and used for collecting Coleopterous and other Creeping Insects. The mouth should be nearly an inch wide, and a cork exactly fitted to it, in the center of which must be inserted a small quill, to afford air, and inserted about an inch beyond the cork, to prevent the insects from escaping. If the bottle is made of tin, and of a larger size, a tin tube must be introduced into its side, and terminating externally at the surface.

A DIGGER.—The instrument is either made of iron or steel, and is about six or seven inches in length, fixed into a turned wooden handle. It is used for collecting the pupae of Lepidopterous Insects, at the roots and in the clefts of the bark of trees; and also for pulling off the bark, particularly from decayed trees, under which many curious and rare insects are frequently found. It is most useful with an arrow-headed point.

SETTING NEEDLES.—Fitted into a small wooden handle, the needle itself should be about three inches long, and about the thickness of a small darning-needle slightly bent from about the middle. A straight needle is used for extending the parts of insects; at one end of the handle is the needle, and at the other a camel's hair pencil, which is used for removing any dirt or dust which may be on the insects. The pencil may be occasionally drawn through the lips, brought to a fine point, and used for disposing the antennæ and palpi of insects of the minute kinds.

SETTING-BOARDS.—These must be made of deal board, from a foot or fifteen inches long, and eight or ten inches broad, with a piece of wood run across the ends, to prevent them from warping. They are covered with cork, which

must be perfectly smooth on the surface, with white paper pasted over it. Several boards will be required, by persons who are making collections, as some of the insects take a considerable time to dry, so that they may be fit for introducing into a cabinet.

The boards should be kept in a frame made for the purpose. It should consist of a top, bottom, and two sides; the back and front should have the frames of doors attached by small hinges, and their centers covered with fine gauze, for the free passage of air; the sides should have small pieces of wood projecting from them, for the boards to rest on; which should be at such a distance from each other that the pins may not be displaced in pushing the boards in or drawing them out. The frame should be placed in a dry, airy situation.

BRACES.—These are merely small pieces of card, cut in different forms, attached to the butterfly and other insects. They are pinned down on the insects, to keep their wings, etc., in a proper state, till they acquire a set.

THE EGGS OF INSECTS.

The eggs of insects preserve their form and color in a cabinet, in general, without much trouble. Swammerdam had a method of preserving them when they appeared to be giving way. He made a perforation within them with a fine needle, pressed out their contents, afterwards inflated them with a glass blow-pipe, and filled them with a mixture of resin and oil of spike.

THE LARVÆ, OR CATERPILLARS.

The easiest way of destroying the Caterpillar is by immersion in spirit of wine. They may be retained for a long time in this spirits without destroying their color.

Mr. William Weatherhead had an ingenious mode of preserving Larvæ. He killed the Caterpillar, as above directed, and having made a small puncture in the tail, gently pressed out the contents of the abdomen, and then filled the skin with fine dry sand, and brought the animal to its natural circumference. It is then exposed to the air to dry, and it will have become quite hard in the course of a few hours, after which the sand may be shaken out at the small aperture and the Caterpillar then gummed to a piece of card.

Another method is, after the entrails are squeezed out, to insert into the aperture a glass tube which has been drawn to a very fine point. The operator must blow through this pipe while he keeps turning the skin slowly round over a charcoal fire; the skin soon becomes hardened, and, after being anointed with oil of spike and resin, it may be placed in a cabinet when dry. A small straw or pipe of grass may be substituted for the glass pipe.

Some persons inject them with colored wax after they are dried.

THE PUPA.

When the insects have escaped from their Pupa skin, the skin usually retains the shape and general appearance it did while it contained the insect. It is therefore ready for a cabinet, without any preparation whatever. But if the

animal has not quitted its envelope, it will be necessary either to drop the Pupa into warm water, or to heat it in a tin case before the fire; the former mode, however, is the best, and least liable to change the colors of the Pupa.

METHOD OF BREEDING INSECTS.

BREEDING CAGES.—These must be made of oak, or other hard wood, as pine is apt to kill the Caterpillars, from its smell of turpentine. The most convenient size for a breeding cage is eight inches in breadth, four deep, and one foot in height. It is not proper to place within a cage more than one species of Caterpillar, as many of them prey upon each other. Indeed, animals of the same species will devour each other, if left without food. The Caterpillars of insects, for the most part, will only eat one particular kind of food, so that it is better to have no more than one sort in a cage.

There must be at the bottom of the cage earth to the depth of two inches; this should be mixed with some fine sand and vegetable earth, if possible, to prevent it from drying. The cages should be kept in a cool cellar or damp place, because many insects change into the Pupa condition under the earth; so that it would require to be somewhat moist, to prevent the destruction of the animal. The shell or case of the Pupa also becomes hard, if the earth is not kept moist; and, in that event, the animal will not have sufficient strength to break its case at the time it ought to emerge from its confinement, and must consequently die, which but too frequently happens from mismanagement.

Some seasons are more favorable than others for the production of Caterpillars, and to keep each kind by themselves would require an immense number of cages, as well as occupy much time in changing the food, and paying due attention to them. To obviate this, some persons having large breeding cages, with a variety of food in them, which must be cleaned out every two days, and fresh leaves given to the Caterpillars; as, on due attention to feeding, the beauty and vigor of the coming insects will much depend.

The Larvæ of insects, which feed beneath the surface of the earth, may be bred in the following manner: Let any box that is about three or four feet square, and two or three feet deep, be lined internally with tin, and a

number of very minute holes be bored through the sides and bottom. Put into this box a quantity of earth, replete with such vegetables as the Caterpillars subsist on, and sink it into a bed of earth, so that the surface may be exposed to the different changes of the weather. The lid should be covered with brass or iron net-work, to prevent their escape, and for the free admission of air.

The young Entomologist should obtain a cabinet of about thirty drawers, arranged in two tiers, and covered in with folding doors. There is a great convenience in this size, as the cabinet is rendered more portable, and at the same time admits of having another of the same size, being placed above the top of it, as the collection increases, without injuring the uniformity, and thus the drawers may be augmented to any extent. It is immaterial whether the cabinet is made of mahogany or oak; sometimes they are constructed of cedar, but seldom of pine, or any other soft wood. Small cells must be made in the inside of the fronts for camphor.

CORKING OF DRAWERS.—The simplest way to get the cork is to purchase it of a cork-cutter, ready prepared, but it will be much cheaper for the Entomologist to prepare it himself. In this case, it should be cut into strips of about three inches wide, with a cork-cutter's knife, to smooth the surface and to divide it. The strips should be fixed in a vise, and cut to the thickness required with a fine saw; but grease must not be used in the operation, as it will not only prevent the cork from adhering to the bottom of the drawer, but will also grease the paper which should be pasted on its surface. The black surface of the cork should be rasped down to a smooth surface. After having reduced the slips to about three quarters of an inch in thickness, the darkest, or worst side of the slip should be glued down to a sheet of brown, or cartridge paper; this should be laid on a deal board, about three feet in length, and the width required for a drawer or box; a few fine nails, or brads, must be driven through each piece of cork to keep it firm and in its place until the glue be dried; by this means, sheets of cork may be formed the size of the drawer. All the irregularities are filed or rasped down quite to a level surface, and then polished smooth with pumice-stone. The sheet, thus formed and finished, is glued into the drawers. To prevent its warping, some weights must be equally distributed over the cork, that it may adhere firmly to the bottom of the drawer. When quite dry, the weights are removed, and the cork covered with fine white paper, but not very thick.

The paper is allowed to be quite damp with the paste before it is placed on the cork, and, when dry, it will become perfectly tight.

Insect cabinets should be kept in a very dry situation, otherwise the antennæ, legs, etc., will become quite moldy. The same evil will ensue if the insect is not perfectly dry before it is placed in the cabinet. Should an insect be covered with mold, it can be washed off with a camel's-hair pencil, dipped in camphorated spirits of wine; in which case the insect must be dried in a warm airy situation before being placed in the cabinet.

There should always be plenty of camphor kept in the drawers, otherwise there is great danger to be apprehended from mites; where these exist, they are easily discovered by the dust which is under the insects by which they are infested. In which case they must be immediately taken out and rubbed clean with a fine camel's-hair pencil, and well imbued with the solution of corrosive sublimate, and then placed near a fire, taking care, however, that too great a heat is not applied, as it will utterly destroy the specimen. The Butterfly, Sphinx, and Moth tribes are extremely liable to the attack of mites, and should, therefore, be frequently examined.

CHAPTER VII. RECEIPTS. FOR VARIOUS ARTICLES USED IN THE PRESERVATION AND SETTING UP OF ANIMALS.

SOLUTION OF CORROSIVE SUBLIMATE.

Mr. Waterton's Method.

Put a good large tea-spoonful of well-pounded corrosive sublimate into a wine bottle full of alcohol (spirits of wine). Let it stand over night, and, the next morning, draw it off into a clean bottle. When the solution is applied to black substance, and little white particles are perceived on them, it will be necessary to make it weaker, by the addition of some alcohol.

A black feather, dipped in the solution, and then dried, will be a good test of the state of the solution: if it be too strong, it will leave a whiteness upon the feather.

ARSENICAL SOAP. *Invented by Becoeur, Apothecary, Metz.*

Arsenic in powder,	2 pounds.
Camphor,	5 ounces.
White Soap,	2 pounds.
Salt of Tartar,	12 ounces.
Powdered Lime,	4 ounces.

The soap must be cut in small and very thin slices, put into a crucible with a small quantity of water, held over a gentle fire, and frequently stirred with a wooden spatula, or a piece of wood of any kind. When it is properly melted, the powdered lime and salt of tartar must then be added, and thoroughly

mixed. It must now be taken off the fire, the arsenic added gently, and stirred. The camphor must be reduced into a powder, by beating it in a mortar, with the addition of a little spirits of wine. The camphor must then be added, and the composition well mixed with a spatula, while off the fire.

It may be again placed on the fire, to assist in making the ingredients incorporate properly, but not much heated, as the camphor will very rapidly escape. It may now be poured into glazed earthen pots, and allowed to cool, after which a piece of paper should be placed over the top, and afterwards some sheep leather, and then set aside for use. The composition is about the thickness of ordinary flour paste.

When it is necessary to use the soap, put as much as will answer the purpose into a preserve pot, and add to it about an equal proportion of water. This is applied to the skin or feathers with a bristle brush.

N. B. It should be kept as close as possible, and used with caution, as it is a deadly poison.

The above is the receipt made use of at the Jardin des Plantes, Paris.

Mr. Laurent's Receipt.

A distinguished French naturalist, Laurent, recommends the following composition, after ten years experience, for preserving the skins of stuffed animals. He observes, at the same time, that it penetrates them with greater readiness, and preserves them much better than any preparation which has hitherto been in use.

Arseniate of Potash,	2 drachms.
Sulphate of Alumine,	2 do.
Powdered Camphor,	2 do.
White Soap, powdered,	1-2 oz.
Spirits of Wine,	6 oz.
Essence of Thyme,	3 drops.

The arseniate of potash, sulphate of alumine, and soap, are to be placed in a vial, with a large mouth, and the spirits of wine to be poured on them, at a heat of *twenty five* degrees, and they will be perfectly combined in twenty-

four hours. The essence of thyme is then added, when the vial must be carefully corked. This composition is to be shaken together, before it is made use of, and it must be spread over the skin of the animal or bird with a brush.

SOLUTION OF PEARL-ASHES.

Two ounces of pearl-ash to one gallon of water.

ANNEALED IRON WIRE.

Take common iron wire, make it red-hot, and suffer it to cool gradually; this renders it soft and pliable, so that it may be easily bent in any direction.

CEMENT.

Fine Whitening,	2 oz.
Gum-Arabic,	2 oz.
Finest Flour,	1-2 oz.
Ox-Gall, a tea-spoonful.	

The whole to be dissolved, and mixed well with water into thick paste.

This is well adapted for attaching different objects, and especially for fixing shells to pasteboard, etc.

GUM PASTE.

White Sugar Candy,	2 oz.
Common Gum-Arabic,	4 oz.

Let these be melted in a pot of hot water, and then strained through a linen or horse-hair sieve. When properly dissolved, add to it two table-spoonfuls of starch, or hair-powder, and mix the whole well together. This paste may be used for many purposes, and it never spoils. It may be dried, and by pouring a little warm water on it, it will soon be ready for use. If it is

wished to be all melted, and hurriedly, the pot containing it should be placed in warm water or sand.

FLOUR PASTE.

Make flour paste in the ordinary way, and add to it a small portion of the solution of corrosive sublimate, or powdered corrosive sublimate. This will prevent the attack of mites, to which paste is very liable when dried. This paste may be dried into a cake, and moistened when required.

SOLUTION OF GUM-ARABIC.

The solution of gum-arabic is made by simply adding water to it. When used as a varnish, or for attaching objects, it is extremely apt to get too brittle in very warm weather, and to crack or split off in scales; to prevent this, a quarter of an ounce of white or brown sugar candy must be added to two ounces of gum-arabic.

PAPER, PASTE, GUMMED.

Take a coffee-pot, filled with water, and add to it a quantity of paper, which has been slightly sized, like that used for printing engravings. Let it boil for three hours, and when the water has evaporated, boil it again for a similar length of time. Take out the paper, and squeeze it well in a colander, and then pound it in a mortar, until it is reduced to a very fine paste. It must then be dried. When it is required for use, add to it some of the solution of gum-arabic; and keep it in a pot for use.

POLLEN POWDER.

The paper made as above directed, when well dried, is pounded in a mortar till it becomes a very fine powder; it is then put into a tin pepper-box, and when any of the parts of Parrots' bills, etc., are wished to have this powdered appearance, a little of the solution of gum-arabic is washed over the part with a camel's-hair pencil, and the powder dusted on it and allowed to dry.

RED VARNISH.

Take a stick of red sealing-wax, beat it down with a hammer, and then put it into a vial, with an ounce of strong spirit of wine, which will dissolve it within four or five hours. It may be applied to any part with a camel's-hair pencil, and it will dry in less than five minutes.

Black, yellow, and green, or indeed any color of varnish, may be made from sealing-wax of these various colors.

To those unacquainted with the combination of colors we may mention that a mixture of blue and yellow produces green; pink and blue makes purple; red and yellow, orange; black, red, and yellow, brown; black and blue, gray. These may be varied, in an infinity of shades, by either color predominating, and by the addition of other colors.

LUTING FOR RENDERING BOTTLES AIR-TIGHT.

Common Resin.

Red Ochre reduced into a fine powder.

Yellow Wax.

Oil of Turpentine.

These must be melted over a fire in the following manner: and the vessel in which it is made should be capable of holding three times the quantity required, to allow room for boiling up. An earthenware pipkin with a handle is the best thing for the purpose, and a lid must be made of tin to fit it. The luting will be rendered more or less brittle, or elastic, as the red ochre prevails:

The wax is first melted, and then the resin; the ochre is then added in small quantities, and stirred quickly with a spatula each time. When all the ochre has been added, it must be allowed to boil six or eight minutes; the turpentine is then added, and briskly stirred with the spatula, and continue to boil it. There is considerable risk of the mixture taking fire, and should it do so, the lid must immediately be put on the vessel to extinguish it.

To ascertain the consistence of the luting, a little must be, from time to time, dropped on a cool plate, or flat piece of iron. If it is too soft, more of the ochre must be added to it; and if too hard, additional wax and turpentine.

TOW AND FLAX SLIVERS.

These are fillets of prepared tow and flax, of from one to three inches in breadth. They are extremely uniform in their thickness, being made to weight, and can easily be procured from any flax-spinning mill, at a moderate price per pound weight.

METHOD OF MAKING ENAMEL-EYES FOR ANIMALS.

Much of the character and expression of animals depends upon their eyes; it will, therefore, be evident that great attention is necessary in the artificial imitation of these.

In this operation, a pipe of baked earth is used, or a tube of glass six or seven inches in length, at the end of which a little white enamel is placed. This is placed to the flame, so that it may be blown. This enamel forms a globe, whose dimensions depend upon the quantity of air introduced. When this globe is of the size wished, we place in the middle, and perpendicularly to the point of the pipe, the quantity of enamel necessary to form the enamel. The second enamel is then incorporated with the first by presenting it to the flame, while attention is paid to turn the pipe gradually round, so that the enamel may diffuse itself equally, and the iris be exactly circular. If it is required that this iris should be of various colors, like that of man for example, small filaments of enamel are distributed in diverging rays of the suitable color; the eye is then placed in the flame, until these have incorporated with the iris, after which the pupil is placed as before directed, and the glass applied as before directed.

During this operation, the globe is almost certain of sinking down, partly from the air escaping, partly from the heat, and from the pressure which is used in applying the different substances; air must again be supplied from time to time to prevent it from losing its form. This becomes particularly necessary when glass is applied, and when it is extended over the whole surface of the iris.

The eye having got its form and size, the pipe is taken away. To effect this, after the air has been introduced, the entrance of the pipe is stopped with the finger, and the back part of the eye exposed to the flame; when the air contained in the globe, and rarified by the pipe, comes through at the place where the flame has most action. This opening is prolonged by turning the point of the flat pincers, or an iron-wire, all round the pipe; one point only is left by which the eye remains fixed. It is then warmed equally all over, after which it is exposed to a gentle heat, and when it again cools, it is separated from the pipe.

ARTICLES REQUIRED FOR SKINNING AND MOUNTING QUADRUPEDS, BIRDS, REPTILES, AND FISHES.

1. A box containing scalpels of different shapes; a pair of scissors with pointed blades, and two or three pointed forceps of different sizes, the extremities of one of which ought to be indented.
2. Two flat pincers, or pliers, large and small.
3. A round pincer for turning wire.
4. A cutting pincer for wire.
5. A hammer.
6. Two files.
7. A triangular.
8. Points for perforating holes.
9. A saddler's awl for drilling holes; also various shoemaker's awls, which will be found useful.
10. Brushes of different sizes for putting the preservative on the animals' and birds' skins, and for smoothing and dusting the feathers.
11. An assortment of iron-wire of all sizes.
12. Flax and tow, coarse cotton. When these cannot be had, untwisted ropes or cords. A quantity of tow and flax slivers for twisting round

the leg-bones of small quadrupeds and birds.

13. Some small hardwood meshes for assisting in stuffing.

INSTRUCTIONS TO TRAVELERS.

The best means of procuring living animals is by applying to the natives of the different countries, who are accustomed to their habits, and the situation in which they are likely to be found, and to take them in traps and snares. They are also more likely to be able to find their retreats, so that they may take these animals in a young state, and also birds in their nests.

By thus securing animals while young, they are much more likely to reach home in a living state. Every exertion should be used to render them familiar, when, being habituated to the appearance of man, they will be more able to resist the effects of a tedious sea-voyage than those which have been taken when wild, and are under a continued degree of excitement. Every care should be taken to soothe and caress them; and there is no animal whose manners cannot be softened by gentle treatment. During fine weather, they should be allowed to take exercise on the deck, as nothing is so injurious to their health and growth as being long pent up in a small cage. While thus confined, it will be obvious that they require a much smaller portion of food than when they can have sufficient room to exercise themselves. Many of these animals are lost from overfeeding. Their diet should be given with great regularity, but always in such quantity as they can easily digest.

Next to food, cleanliness is of the utmost importance, and if this requires too much of the attention of those who are bringing them home, it will be easy to procure the assistance of some of the crew. And unless this is strictly attended to, there is little chance of preserving their health.

When animals' skins are imported, it is also necessary to bring the head and feet. Those of the mammalia, which can be put into a barrel or bottle, should be preserved entire in spirits.

In the event of not being able to transport the carcass the next best thing is to bring the skeleton along with the skin. It will not be necessary to mount these. All that is required is to boil the bones, take off the flesh, and dry

them. Afterwards all the bones belonging to the same skeleton should be put in a bag by themselves, taking care to fill up the bag with dried moss, or any other substance which will prevent friction. The more effectually to secure this, the small and tender bones ought to be wrapped in paper. It is of the utmost consequence that not a bone should be lost.

In shooting birds, it is of much importance not to use the shot too large; indeed, it ought to be proportioned, as nearly as possible, to the size of the bird to be shot at. When the bird is killed, the blood must be carefully wiped away, and a little cotton must be put into the bill to prevent the blood flowing from it to injure the feathers. The wound should also be stuffed with cotton.

Birds should be skinned as soon as possible, as the feathers are apt to fall off if kept too long. The os coccygis must be kept attached to the skin. If several individuals of the same species be killed, one should, if possible, be preserved entire in spirits, with the whole muscles of the body. If the bird has a fleshy crest, it ought to be preserved in spirits.

It is of the utmost consequence to procure the male, female and young, and these at different ages, besides, as many species are subject to great variety, in their progress from the young to the adult state. This is more particularly the case with Eagles and Hawks, many of which have been described as different species in their immature state. The eggs and nest should also be procured.

REPTILES.—The chief thing to be attended to in skinning reptiles is not to injure the scales; and in the lizard kind care must be taken not to break the tail. But for all the smaller and middle-sized species the best mode is to preserve them in spirits; and of the larger kinds, which are skinned, the skeletons ought to be kept. The flesh should be taken away with knives and scalpels as well as possible, and the bones thoroughly dried and packed in a box with cotton or grass, and they can be articulated after they are brought home. When the skeletons are too large they may be separated into convenient parts for packing.

[THE END.]

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Transcriber's notes:

In the original, there are two CHAPTER V's. The last two chapters have been renumbered to correct this.

The following is a list of changes made to the original. The first line is the original line, the second the corrected one.

the brains taken out by enlarging the occipital opening
the brains taken out by enlarging the occipital opening

annointed, and the body stuffing completed with chopped flax.
anointed, and the body stuffing completed with chopped flax.

The fore-eg wires are fixed in the same manner,
The fore-leg wires are fixed in the same manner,

drawn through the rump, and and passed up to the inside of the neck,
drawn through the rump, and passed up to the inside of the neck,

and drawn through bill, to prevent the head from stretching
and drawn through the bill, to prevent the head from stretching

but after a few trials this will be unnecessary.
but after a few trials this will be unnecessary.

while the thread is pulled on the opposite side;
while the thread is pulled on the opposite side;

It may be that a bird essentially aerial, like the wift,
It may be that a bird essentially aerial, like the swift,

not the character of any part of the skin, or earuncle of the
not the character of any part of the skin, or caruncle of the

These must be imitated with gum arabic and powdered starch,
These must be imitated with gum-arabic and powdered starch,

A small packet of camphor should be rapped in a piece of rag,
A small packet of camphor should be wrapped in a piece of rag,

most convenient size for a breeding cage is eight inches in breath,
most convenient size for a breeding cage is eight inches in breadth,

A small straw or pipe of gras may be substituted for the glass pipe.
A small straw or pipe of grass may be substituted for the glass pipe.

this should be mixed with some find sand and vegetable earth,
this should be mixed with some fine sand and vegetable earth,

8. Point's for perforating holes.
8. Points for perforating holes.

also various shoemakers awls, which will be found useful.
also various shoemaker's awls, which will be found useful.

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